The RUBBER AGE

May, 1947

TECHNOLOGY DEPARTMENT

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DETROIT B

CUMATE

CUMATE alone or with **ALTAX** is being used in GR-S stocks extensively today. When natural rubber or reclaim is present the addition of AGERITE WHITE is desirable.

The use of CUMATE is growing for at least four reasons:

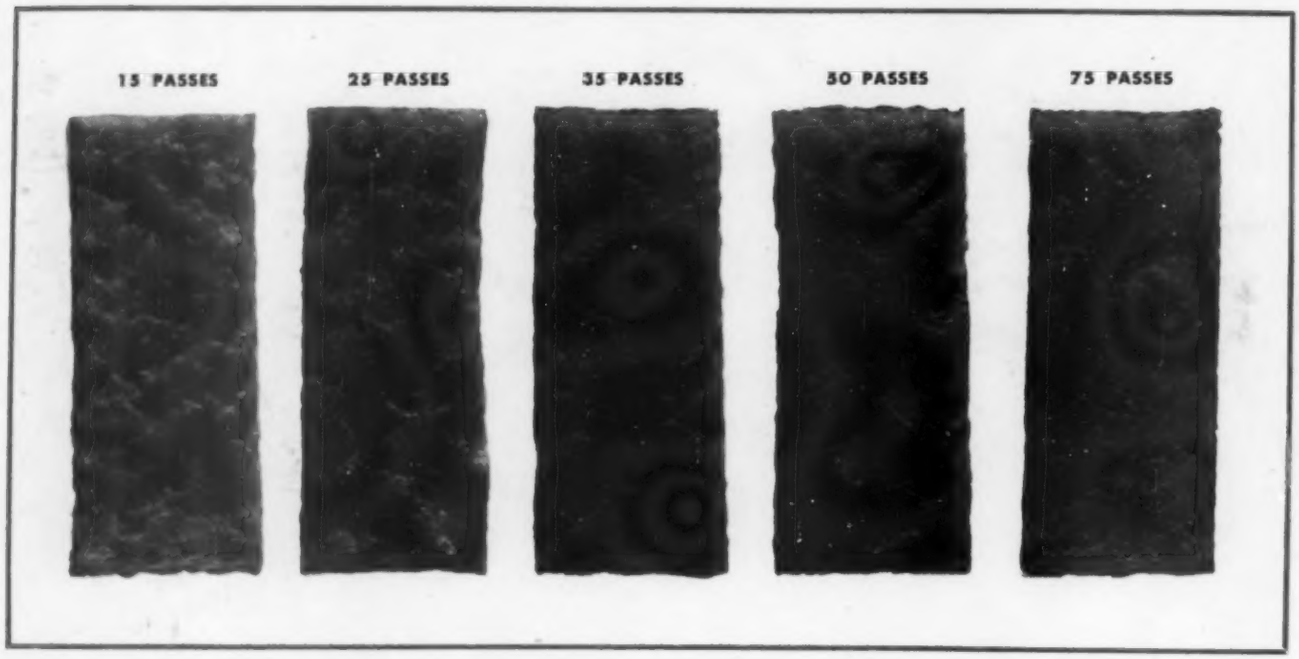
1. *Faster cures*
2. *Safe processing*
3. *Improved quality*
4. *Reduced manufacturing costs*

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

NEOPRENE TYPE S

a new, unusual elastomer



Where a firm, tough elastomer that can be used without vulcanizing would be an advantage . . . where resistance to mill breakdown is desired...the use of Neoprene Type S offers interesting possibilities.

The properties of this new elastomer have made it an outstanding material for crepe soles. In products where the elimination of a vulcanizing operation is an advantage or a necessity, this new polymer is worth investigating. Unvulcanized Neoprene Type S displays a remarkable degree of toughness and resistance to abrasion and heat. It resists softening on aging or in direct sunlight, has unusual resistance to grease, oils and gasoline.

Neoprene Type S has unique processing characteristics. Since it resists plasticization by milling, compounding ingredients can be incorporated, and the resulting stock has sufficient toughness for various uses. As shown above, sheets of Type S retain their toughness and uniform texture after as many as 75 passes through a mill. This will be particularly significant to those familiar with the effect of milling on natural rubber crepe. This resistance to breakdown has proved especially valuable in the manufacture of crepe soles. Soles made from Type S can be produced in a wide range of colors, since the milling necessary for incorporating the colors does not result in a loss of "crepe."

Rubber technicians will be interested in the possibilities of Type S as a separate elastomer and in combination with other types of neoprene. More complete data on Neoprene Type S is contained in Report 47-1—extra copies are available. Ask for samples of Type S for experimental purposes. Write to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co., (Inc.), Wilmington 98, Del.

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

DU PONT

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★ EXCELLENT ★ AGE RESISTANCE

RESILIENT parts made from HYCAR American rubber resist the aging effects of air, sunlight, ozone, heat, cold, and all other types of oxidation. That's why they *stay* resilient—and stay on the job for a long, long time.

Other important properties of HYCAR American rubber are shown in the box at the right. And it's important to know that these properties may be had in an almost limitless number of combinations—each compounded to meet a given set of service conditions.

We make no finished products of HYCAR. But we urge you to ask your supplier for parts made from this versatile material. You'll learn for yourself that it's wise to use HYCAR—in difficult or routine applications—for long-time, dependable performance. For more information, please write Dept. HB-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE — *insuring dimensional stability of parts.*
2. HIGH TEMPERATURE RESISTANCE—*up to 250° F. dry heat; up to 300° F. hot oil.*
3. ABRASION RESISTANCE—*50% greater than natural rubber.*
4. MINIMUM COLD FLOW—*even at elevated temperatures.*
5. LOW TEMPERATURE FLEXIBILITY—*down to —65° F.*
6. LIGHT WEIGHT—*15% to 25% lighter than many other synthetic rubbers.*
7. AGE RESISTANCE—*exceptionally resistant to checking or cracking from oxidation.*
8. HARDNESS RANGE—*compounds can be varied from extremely soft to bone hard.*
9. NON-ADHERENT TO METAL—*compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)*

Hycar
Reg U S Pat Off
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE brand chemicals

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

SOMETHING NEW HAS ARRIVED!
PHILBLACK-O!

And oh, oh, *oh* . . . what wonderful resistance to abrasion you get with this little baby working for you! Yes, he's a member of the famous Philblack family . . . famous for lots of things! Famous for easy processing . . . famous for resistance to cut and crack growth. But Philblack-O is a specially tough little customer . . . a regular superman when it comes to abrasion resistance!

So if you're looking for ways to make your rubber products last longer . . . to stand wear and tear . . . send for a trial order of little Philblack-O. It is specially recommended for use in tire treads to give them longer life and higher mileages. Oh what a baby!

PHILLIPS PETROLEUM COMPANY

Philblack *Division*

EVANS SAVINGS AND LOAN BUILDING • AKRON 8, OHIO

Fishing shirt manufactured by Archer Rubber Company

Picture of a dry fly fisherman

Storm-proof fishing shirt is another interesting application of GEON raw materials

IT'S the fisherman that's dry in this case—not the fly. That's because he's wearing a new kind of fishing shirt—fabric with a tough coating made from one of the GEON polyvinyl resins. Thanks to the coating the shirt is completely waterproof. It resists the aging effects of sun and rain and air. He can wear it through the brush along the bank and it won't scuff. When he gets home he can roll the shirt into a ball and throw it in the corner of the closet. When he gets it out again it'll be as good as new—no sticking, no cracking, even when rolled up wet.

These and many other important properties may be found in a wide variety of products made from GEON. Such products can be made to resist oils, greases, foods, chemicals, heat, cold, mildew, and many other normally destructive factors. They may be brilliantly or delicately colored—clear or opaque—flexible or rigid. Processing methods include pressure or injection molding, calendering or casting sheet or film, solution or latex coating and impregnating, and extruding.

Other raw materials made by B. F. Goodrich Chemical Company include HYCAR American rubber, KRISTON thermosetting resins, and GOOD-RITE chemicals. While we make no finished products from any of these materials, we'll be glad to help with special problems or applications. For more information please write B. F. Goodrich Chemical Company, Dept. R-5, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG T M U S PAT OFF

For technical data please write Dept. CB-5

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Surprising how BUFFALO can help!

just a few suggestions by BUFFALO:

5213 TO CONSERVE CARBON BLACK.

U. S. 5212 FOR ABRASION RESISTANCE.

BISON FOR BETTER SPONGING.

U. S. CAYUGA FOR SMOOTH COATINGS.

RED OAK FOR PIGMENT SAVING.

U. S. 140 FOR FAST PROCESSING.

TIOGA FOR INCREASED RESILIENCE.

Constant research assures you continued high quality in Buffalo Reclaims

U. S. RUBBER RECLAIMING CO., Inc.

500 FIFTH AVE. • NEW YORK 18, N. Y. • *(Plant at Buffalo, N. Y.)*

Trenton...H. M. Royal, Inc., 689 Pennington Avenue
Toronto...H. Van Der Linde, Ltd., 156 Yonge Street

64 Years Serving the Industry Solely as Reclaimers

From Tires for Motor Cars to Grips for Handle Bars

Dutch Boy: "It's true of almost every product . . . if it's made with rubber . . . *it's better made with Red Lead.*"

Plant Chemist: "Just why are you so sure?"

Dutch Boy: "First, experiments showed, then experience *proved,* that compounding rubber with #2 RM Red Lead gives the advantages listed on the right."

Plant Chemist: "But don't those advantages depend on what I make?"

Dutch Boy: "Yes, they do. You get all seven if you make tires; but *most* of them apply with other fields, too."

Plant Chemist: "But don't they depend on the base I use?"

Dutch Boy: "They apply whether you work with GR-S, GR-S-10, GR-M, GR-A or GR-I. Just let us know your specific application, and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, New York."

CHOOSE YOUR OWN Rx REASONS FOR COMPOUNDING RUBBER WITH #2 RM RED LEAD

1. *Improved Heat Stability—Retention of Elasticity*
2. *Lower Heat Build-up—Cooler Running*
3. *Economical*
4. *Faster Curing Rate*
5. *Extended Curing Range*
6. *Excellent General Physical Properties*
7. *Safe Processing*

NATIONAL LEAD COMPANY—New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

If it's made with ... it's better made with Rx RUBBER RED LEAD

FOR molded products and extrusions, **PLIOLITE S-6** is a reinforcing material of great value.

PLIOLITE S-6 is especially adapted for use in synthetic rubbers. It is light-gravity and non-discoloring. Easy to work with, it offers you these advantages:

1. It provides more uniform, more easily handled compounds because it acts as a plasticizer at processing temperatures.
2. Its reinforcement is positive — coupling extra hardness with negligible loss in elongation. Often elongation is increased.
3. Its thermoplasticity makes it particularly useful for smooth extrusions and molded products.

Use **PLIOLITE S-6** for all compounds needing a light-color, low-gravity stock of 70-90 durometer hardness with good processing characteristics and moldability. It is effective with GRS, Neoprene, Buna N and natural rubber. Available as a powder for your own mixing, or in master batches of whatever synthetic you select. For complete information and sample, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

Pliolite—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER

A WIDE RANGE OF USEFULNESS

PELLETEX for Wire Insulation

Cracking of wire jackets from ozone and temperature changes is greatly retarded when PELLETEX, SRF Black is used in the compound. Furthermore, PELLETEX helps keep the insulation intact when roughly used in mines, garages and factories where cables are often dragged across sharp corners and through oil and grease.

PELLETEX and GASTEX offer unexcelled aging, low heat build-up and easy processing properties. Second to none for wire jacket compounds.

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GENERAL ATLAS CARBON CO.
PELLETEX
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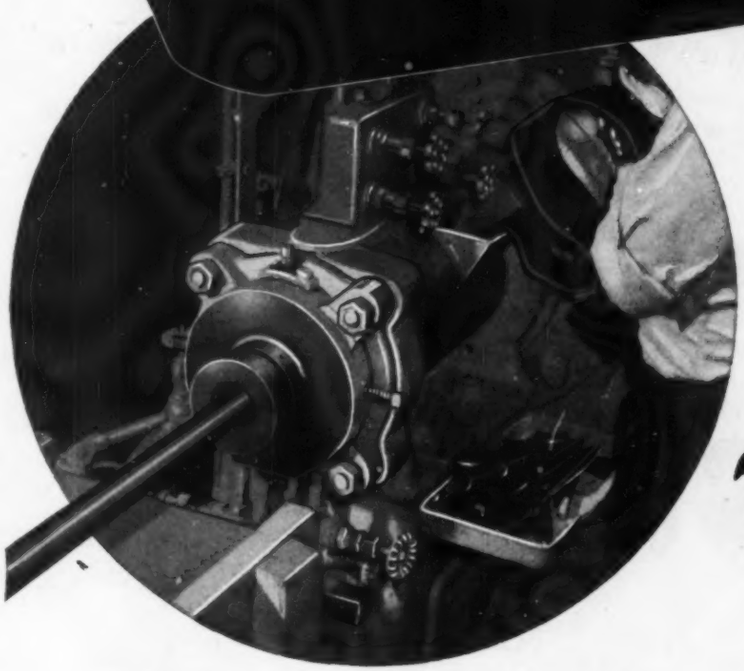
DISTRIBUTOR
HERRON BROS. and MEYER
NEW YORK, N. Y.
AKRON, OHIO

IT TUBES *Without* PLASTICIZERS



another *Plus* FEATURE OF BUTAPRENE NAA by Firestone

Is your problem close tolerance in cut gaskets? Is it complicated through leaching of plasticizers by solvents—particularly aromatics? Then specify Butaprene NAA for your extruded gasket stock. It processes easily, tubes smoothly, holds *exactly* to specification. It's the *ideal* elastomer for injection molding.

Easy extrusion is just another *plus feature* of the Butaprene polymers that helps solve your compounding problems. For complete information on what Butaprene will do for you, write Xylos Rubber Company, Distributors, Akron, Ohio.

Listen to the Voice of Firestone every Monday evening over NBC

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For Easier Workability always Specify BUTAPRENE N

a Clean Mill Room

"FREE FROM DUST"

Makes healthier, happier workers!

. . . Excessive handling of stocks caused by the obsolete "dusty method" wastes time and creates greater labor cost. The discomfort, annoyance and disorderliness alone caused by 'dust' is an intangible expense item. Correct this condition at a fraction of the former cost with —

GLYCERIZED LUBRICANT

(LIQUID CONCENTRATE)

. . . Avoid the "dust nuisance" simply by dipping the hot rubber slabs directly into a GLYCERIZED solution. All stickiness is done away with. Complete separation of piled stocks is assured.

. . . Follow specific directions furnished with each shipment. This includes easier extruding, lubrication of molds, mandrels, air bags, belt drums, insulated wire and cable, etc. GLYCERIZED lends that glossy, satiny finish so desirable in rubber products.

. . . GLYCERIZED *is a versatile lubricant of unparalleled processing and finishing properties for all types of synthetic rubbers as well as for natural rubber, reclaim or mixtures thereof.*

MADE BY THE MAKERS OF
RUBBEROL AND SYNTHOL

GET THE GENUINE from GENSEKE

AVAILABLE ONLY IN DRUMS, HALF DRUMS AND QUARTER DRUMS.

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.

Serving the

Rubber Processing

industry for over 30 years!

For Washers · Crackers ·

Refiners · Mills · Calenders ·

All Types · All Sizes ·

In the hardest, most exacting rolling applications in the rubber processing industry, you will find UNITED ROLLS serving better, more efficiently, more economically. Their consistently superior performance is the result of many years experience in roll design and manufacture, sound engineering and unsurpassed production facilities. Unsparing research, and constant study of the industry's requirements, have made and kept them favorites with rubber manufacturers in all parts of the world.

UNITED ENGINEERING AND FOUNDRY COMPANY
Pittsburgh, Pennsylvania

Plants at Pittsburgh · Vandergrift · New Castle · Youngstown · Canton

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q., Canada

SUN "JOB PROVED" PRODUCTS CUT COSTS, SPEED PRODUCTION, IMPROVE QUALITY

Proof of the value of any industrial product lies in the experience that practical men have had with it. Sun products have been "Job Proved" in the lubrication of almost every type of mining, manufacturing, power and transportation equipment . . . in refrigeration and air-conditioning . . . in metal cutting, tempering and quenching . . . in the processing of textile fibers, leather, natural and synthetic rubbers . . . in the impregnation of electrical, electronic, and packaging materials of various kinds.

To help you find solutions to problems in any of these fields, Sun Oil Company offers a wide selection of "Job Proved" petroleum products, plus the experience of Sun Engineers. Their know-how and detailed product information are yours for the asking, without obligation. Telephone your local Sun office, or write Dept. RA5 . . .

SUN OIL COMPANY
Philadelphia 3, Pa.

"JOB PROVED" PETROLEUM PRODUCTS FOR INDUSTRY

SUN INDUSTRIAL OILS

SOLNUS OILS — Well-refined straight mineral oils. Stand up under hard use for long periods of time. Recommended for use in the machine tool industry, in air compressors, certain types of Diesels, etc.

SUNVIS OILS — Are in the same category as Solnus Oils with the difference that, in addition, they meet practically all paraffinic and high V.I. oil specifications.

OCNUS OILS — Low carbon-content oils, containing an additive which minimizes oxidation and gives detergency. Ideal lubricants for internal combustion engines subjected to continuous heavy loads under the most adverse operating conditions.

DYNAVIS OILS — Low pour point inhibited oils which help prevent formation of harmful corrosive and sludge-forming acids. Well-suited for engines fitted with alloy bearings and operated at high temperatures.

SUNTAC OILS — 100% petroleum products which have been treated to increase their adhesiveness. Recommended for general lubrication in all industries where sudden shocks and reversal of loads take place. These oils cling to the parts to be lubricated.

CIRCO OILS — Used for general lubrication of industrial machinery when straight mineral oils are required.

SUNISO REFRIGERATION OILS — Have extremely low pour points and long life stability characteristics. Initially neutral and resistant to formation of detrimental acids under service conditions. The most outstanding oils in the refrigerating and air-conditioning fields.

STEAM CYLINDER OILS — High flash and fire point lubricants for either saturated or superheated steam conditions and for worm gear speed reduction units.

SUN CAR JOURNAL OILS — Dark oils meeting A.A.R. Specifications. For use on railroad cars and waste-packed bearings of railroad equipment.

SUN DELAWARE OILS — Dark oils for general lubrication on older type industrial machinery.

SUNOCO WAY LUBRICANT — Has good metal-wetting and adhesive properties, ample viscosity and E.P. qualities. For use on tableways, as it eliminates chatter and scoring . . . resists corrosion.

SUN MARINE ENGINE OILS — Compounded with special emulsifying agents in order to provide adhesion to and lubrication of working parts in the presence of water. For the lubrication of bearings, eccentrics, cross-heads and various other parts of steam engines.

ROCK DRILL OIL — Heavy-duty adhesive type oil. For use in jack-hammers, stopers and drifters on heavy-duty mining operations.

SUNVIS 900 SERIES TURBINE OILS — High V.I., predominantly paraffinic oils, of uniform 0°F. pour points, containing additives to give high oxidation stability and corrosion resistance under practical operating conditions. Modern oils for turbine and hydraulic systems.

SUN INDUSTRIAL GREASES

SUN CUP GREASES — Water resistant. For grease cup and grease gun application when the service is not severe.

SUN GUN GREASES — Smooth greases made with medium viscosity oil. Stable under pressure in power guns or booster guns.

ADHESIVE PRESSURE GREASES — Won't drip or splash and are excellent lubricants for open gear applications.

SUN DARK PRESSURE-SYSTEM GREASES — For power-driven central grease lubricating systems in heavy industries. Can also be used as a "medium cup grease."

SUN MINE CAR GREASES — Available in several grades. Suitable for both anti-friction bearings and plain bearing cavity-type wheels.

SUN ROLLER BEARING GREASES — For use on electric motors and generators and other high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS — Black adhesive open gear compounds and wire cable greases. Recommended for open gears on metalworking power presses, mining machinery, old reduction mills, crushers, pump gears, etc.

SUN MINING MACHINE LUBRICANT — Semi-fluid. For use where a light but adhesive type grease is required. Free from separation or decomposition.

SUNOCO TRACTOR ROLLER COMPOUND — For miscellaneous parts of caterpillar or crawler-type tracks. Provides good lubrication with exceptional sealing qualities.

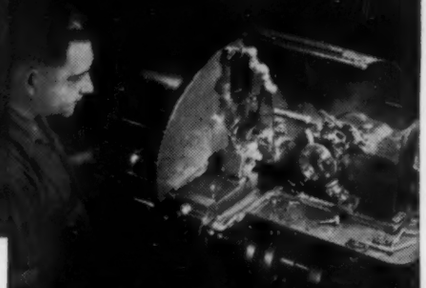
SUN METALWORKING OILS

SUNICUT — Straight or non-emulsifiable transparent cutting oils. Recommended for automatic screw machines and for heavy-duty machining operations.

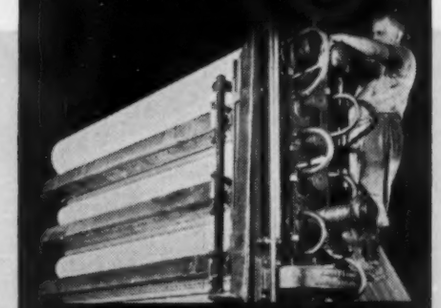
SUN INDUSTRIAL

JOB PROVED

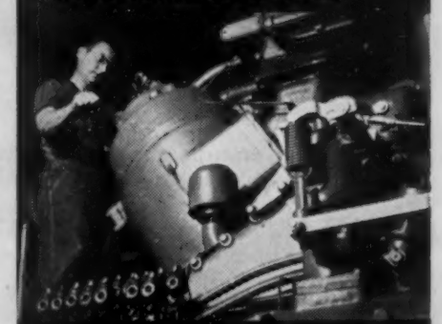
RUBBER MANUFACTURER saved $3,000 a year with a Sun Processing Aid.



ALUMINUM PARTS MANUFACTURER increased output 43% with Sun Cutting Oil.



PAPER MILL slashed annual lubrication bill $2,874 by using a Sun Grease.



POWER PLANT found Sun Diesel Lubricant lasted 50% longer.

A TEXTILE MILL increased slashing speed 60% by adopting a Sun Processing Oil.

SUNOCO EMULSIFYING CUTTING OIL—A self-emulsifying oil which produces a stable white emulsion when mixed with water. Sunoco is an efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and non-ferrous metals. It is also an excellent grinding coolant.

SUN QUENCHING OILS—Specially refined oils designed to develop maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel up to 550°F. Due to their low carbon content and stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum and brass.

SUN ANTI-RUST COMPOUNDS—Petroleum base oils with chemical additives designed to prevent the rusting and corrosion of steel.

SUN PROCESSING OILS

SUNOTEX TEXTILE OILS—Designed to impart certain additional properties to various forms of fibers during their processing from the fiber state into a manufactured product. All Sunotex textile oils are emulsifiable in water.

SUN COTTON CONDITIONING OILS—Pale mineral oils which condition the cotton. They prevent waste by cutting down excessive amounts of "fly" or fine air-borne particles of lint.

SUN ASBESTOS FIBER CONDITIONING OIL—Used for spraying on the asbestos during processing. Fibers are not so readily damaged or broken down into harmful dust when this product is used.

SUN CORDAGE OILS—Are adaptable in various formulae used by cordage manufacturers. They are selected products which are highly compatible with additives.

CIRCOSOL—2XH (Rubber Processing)—An elasticator and processing aid for GR-S particularly.

CIRCO LIGHT PROCESS OIL (Rubber Processing)—A processing aid and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber particularly. Used for GR-S to some extent.

SUNDEX 53 (Rubber Processing)—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established outstanding processing aid for footwear rubber stocks.

CIRCOMAR-5AA (Rubber Processing)—A black colored product used in reclaiming natural rubber scrap. Used also as substitute for asphalt fluxes in processing natural and GR-S rubber. Free-flowing at room temperature.

SUN LEATHER OILS—Mineral base leather oils. Used for obtaining the desired tensile strength, proper temper and a controlled moisture content. They maintain a light even color . . . mix well . . . distribute evenly.

SUN MISCELLANEOUS INDUSTRIAL PRODUCTS

SUN SPIRITS—For the thinning of paints, varnishes, and enamels. Also for metal cleaning. This product is a pure water-white petroleum solvent and is free of corrosive sulphur.

SUN WAXES—Used in packaging, sealing, coating, waterproofing and for numerous manufacturing and chemical processes.

PRODUCTS

SUNOCO

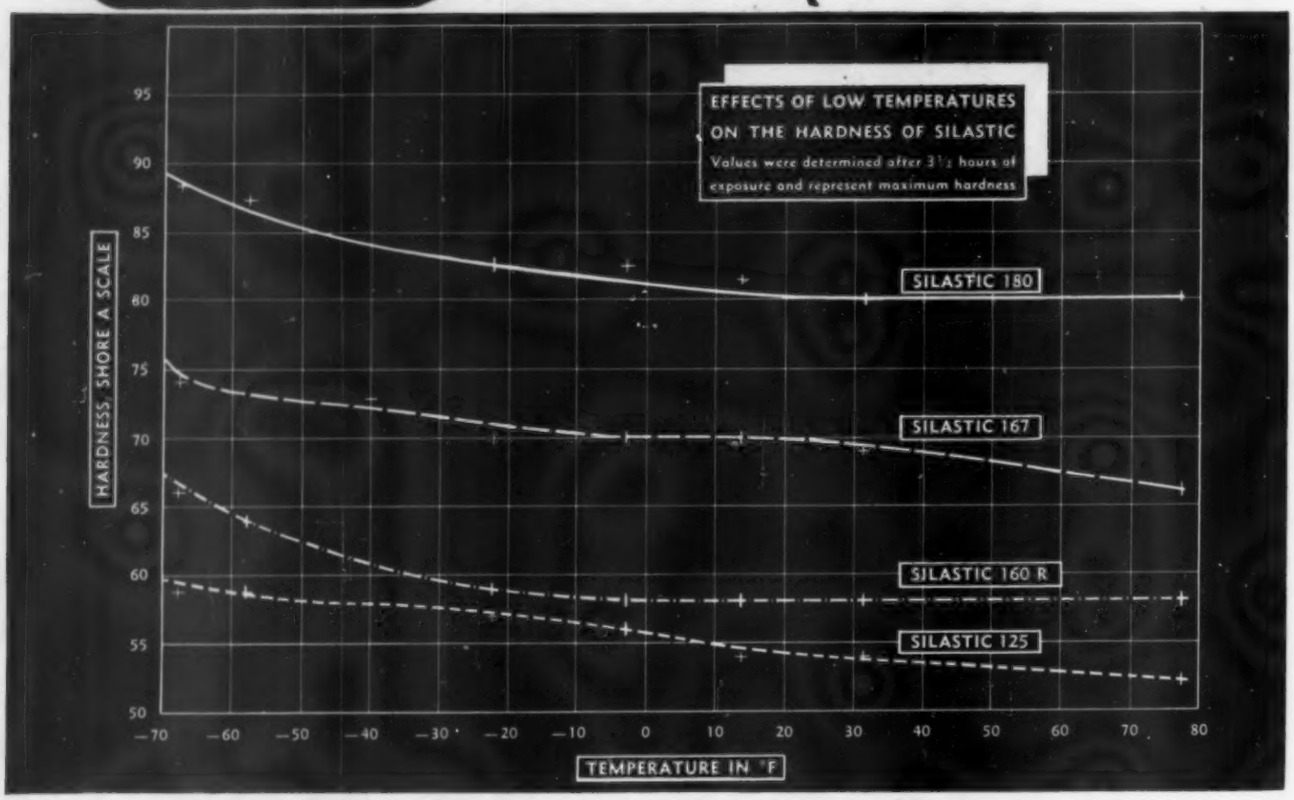
DC

DOW CORNING

SILICONES

SILASTIC*
VARNISHES
RESINS
FLUIDS
GREASES

In Arctic Cold or Oven Heat...



SILASTIC STAYS ELASTIC!

Silastic remains flexible at lower temperatures than any other rubber-like material, and still keeps its resiliency at temperatures far above the limits of any natural or synthetic rubbers. The graph reproduced above shows how little the various kinds of Silastic increase in hardness at temperatures down to −70°F.

In every case, the values given in this graph are the maximum durometer readings obtainable at the test temperature. Even more important in many low temperature applications is the fact that these same hardness values will be obtained even after the test samples have been exposed for an indefinitely long period of time at 300-350°F.

Brittle points are also of primary importance to anyone seeking a rubber-like material useful at both extremely low and high temperatures. The brittle points of the various kinds of Silastic were determined by holding the samples at progressively lower temperatures for 5 hours.

Brittle point values ranging from −70°F. to −100°F. are given in the table at the right.

BRITTLE POINTS OF SILASTIC
(ASTM D 736-43T)

after 5 hours exposure to test temperature

Silastic	°F.	°C.
120	−90 to −100	−68 to −73
125	−90 to −100	−68 to −73
150	−70	−57
160	−70 to −90	−57 to −68
160 Red	−90	−68
167	−80	−62
180	−90	−68
181	−80	−62

*TRADE MARK, DOW CORNING CORPORATION

For information about Silastic as a gasketing material write for leaflet No. V 13-1.

DOW CORNING CORPORATION · MIDLAND, MICHIGAN

New York · Chicago · Cleveland · Los Angeles
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

Dow Corning

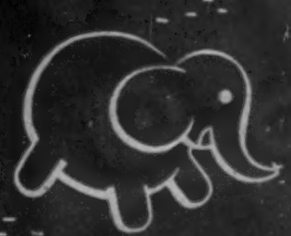
FIRST IN SILICONES

LOTOLS

FOR DIPPED GOODS

tailor-made especially to meet the requirements of the meticulous manufacturer!

These dipping compounds are made with the highest quality raw materials and are available in a wide range of colors.



they are compounded by experts for:

- ★ low modulus
- ★ high tensile strength
- ★ softness of texture
- ★ rapid film build-up

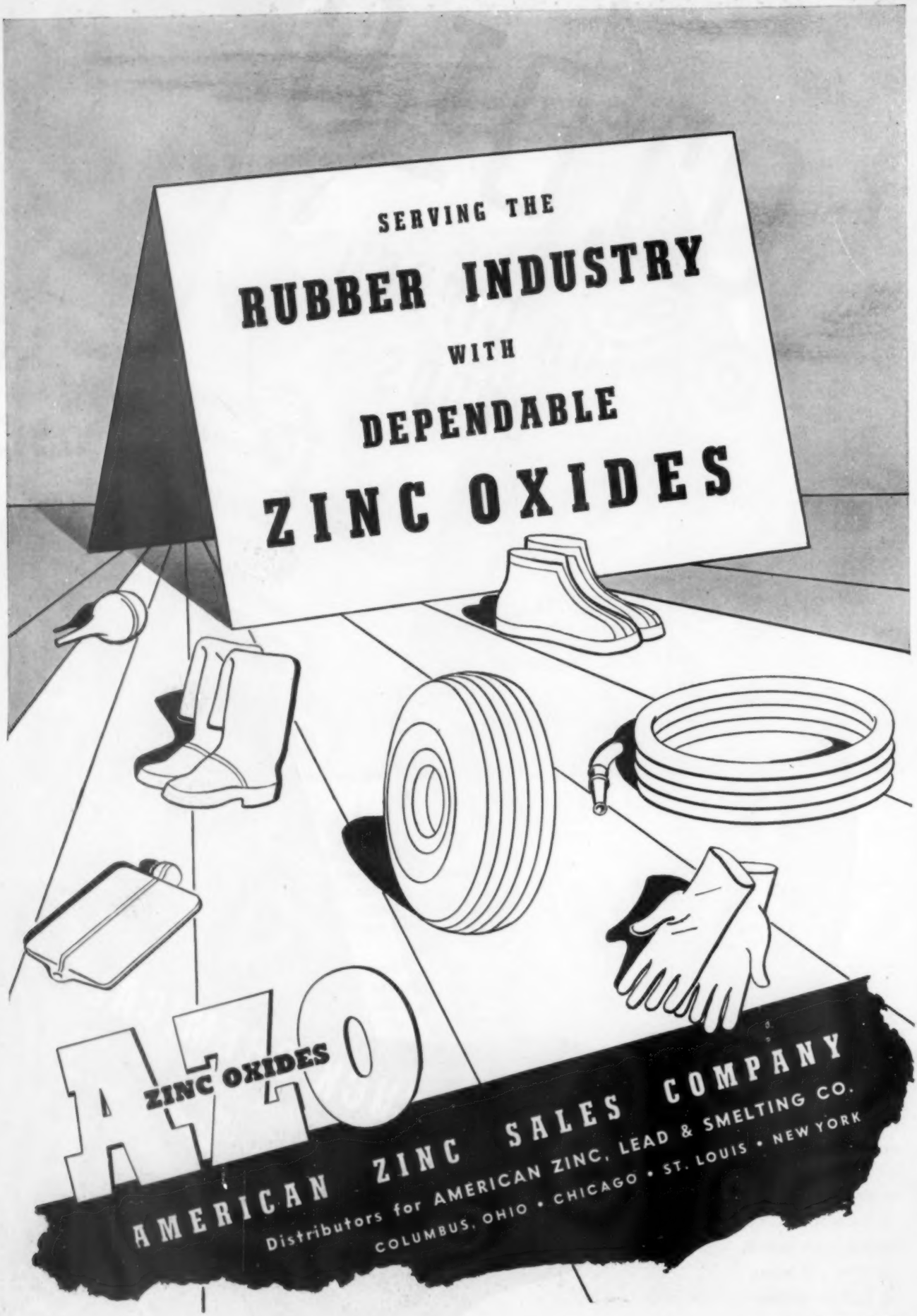
Ask for samples of these special Lotols and compare

NAUGATUCK CHEMICAL

Division of the United States Rubber Company

NAUGATUCK, CONNECTICUT

BRANCHES: AKRON • BOSTON • DETROIT • LOS ANGELES • NEW YORK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WITH
DEPENDABLE
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AZO
ZINC OXIDES
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Distributors for AMERICAN ZINC, LEAD & SMELTING CO.
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SPHERON 9

(EASY PROCESSING CHANNEL)

Prime Requisites

- LOW HEAT GENERATION DURING MILLING
- LOW HEAT GENERATION ON THE ROAD

Cabot's Spheron 9 assures both*. . .

Low Heat Buildup from Start to Finish

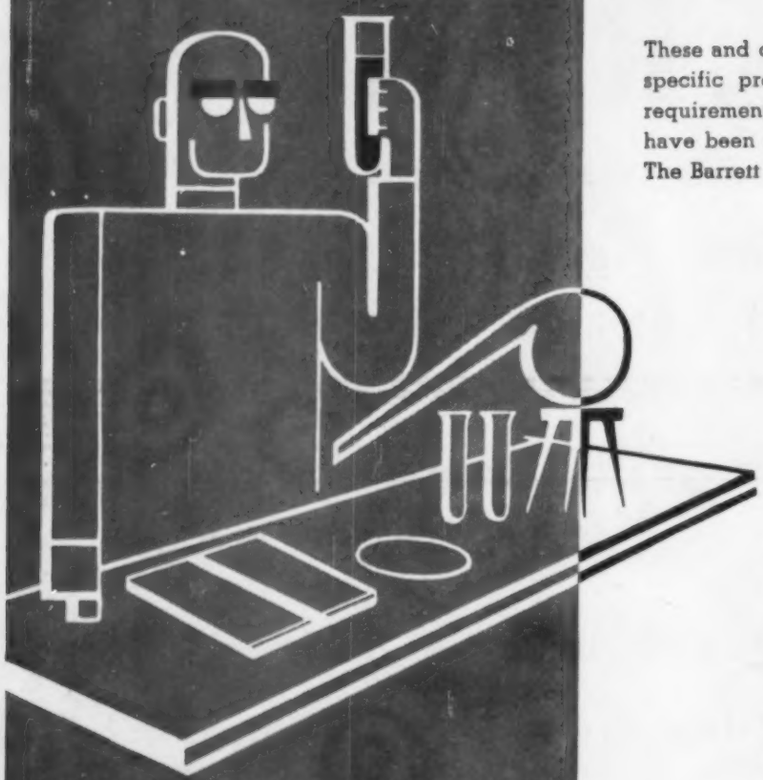
*Especially in GR-M.

CABOT

GODFREY L. CABOT, INC. 77 FRANKLIN STREET BOSTON 10, MASS.

FROM THE CATALOG OF BARRETT

RUBBER COMPOUNDING MATERIALS...



These and other hydrocarbons and oils, each with specific properties to fulfill a particular set of requirements in the rubber and allied industries, have been developed over a period of years by The Barrett Division.

CARBONEX* Rubber Softener and Extender

CARBONEX* S Rubber Softener and Extender

CUMAR* Paracoumarone - indene Resin

BARDOL* Rubber Compounding Oil

BARDOL* B Rubber Compounding Oil

DISPERSING OIL No. 10

B.R.H.* No. 2 Rubber Reclaiming Oil

B.R.S. No. 700 Rubber Softener

B.R.T.* No. 3 Rubber Reclaiming Oil and Saturant

B.R.T.* No. 4 Rubber Reclaiming Oil

B.R.T.* No. 7 Rubber Softener

B.R.V.* Rubber Softener

B.R.C.* No. 20 Rubber Plasticizer and Extender

RESIN "C"* PITCH

The Barrett Division maintains a completely equipped and staffed Rubber Research Laboratory. Your inquiries involving the use of Barrett Rubber Compounding Materials are invited.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.,
5551 St. Hubert Street, Montreal, Que.

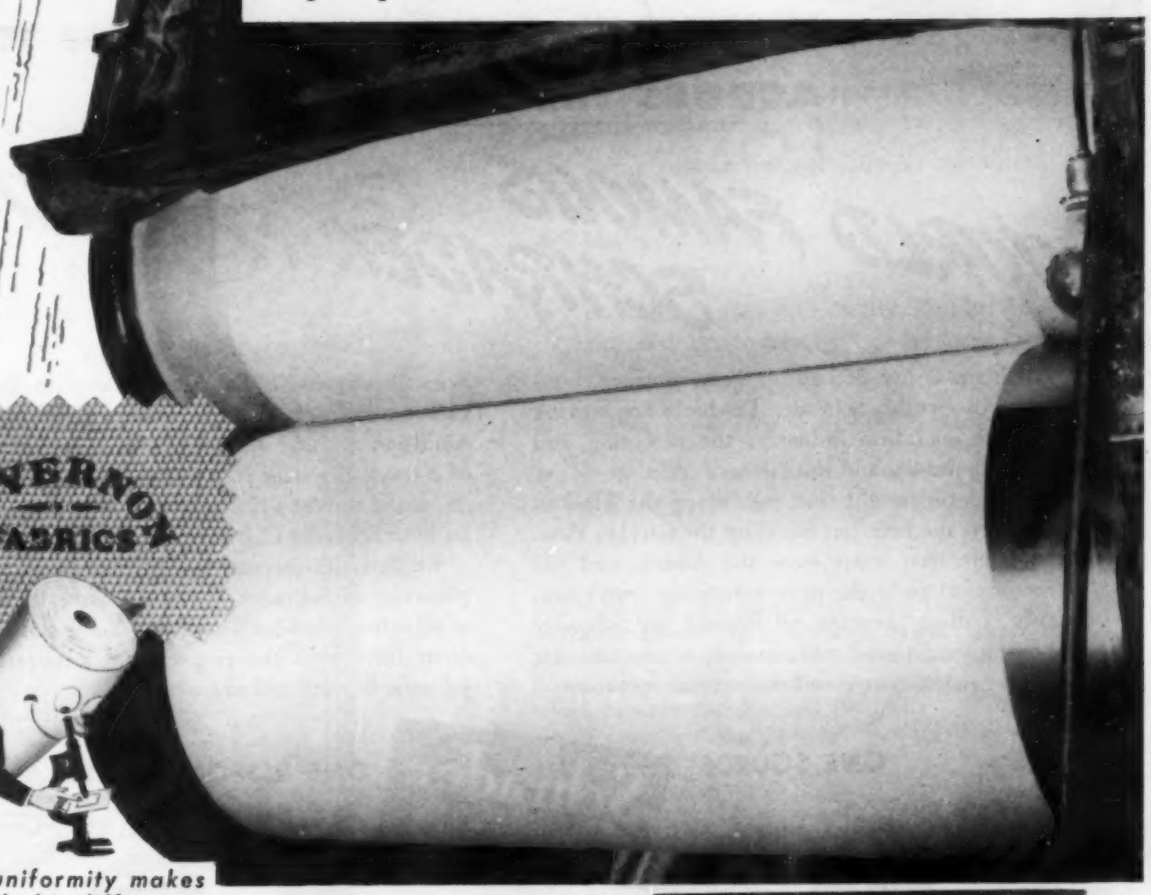
*Trade-mark Reg. U. S. Pat. Off.

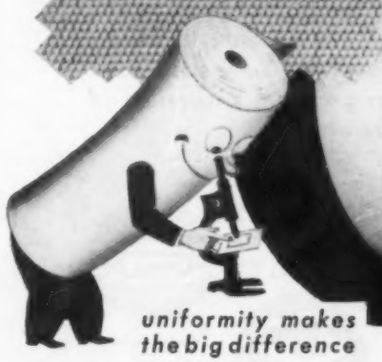
Barrett*

Fabric Uniformity Means Production Speed with Quality

Top production speed consistent with quality is always the watchword of rubber processors.

Mt. Vernon fabrics—better, tougher, more uniform than ever—are the answer to exacting production demands. Choice grades of cotton uniformly spun and woven into Mt. Vernon fabrics result in uniform absorption, strength, toughness and resiliency—easier, faster calendaring. For speed with quality—specify Mt. Vernon fabrics.





uniformity makes the big difference

Mt. Vernon-Woodberry Mills

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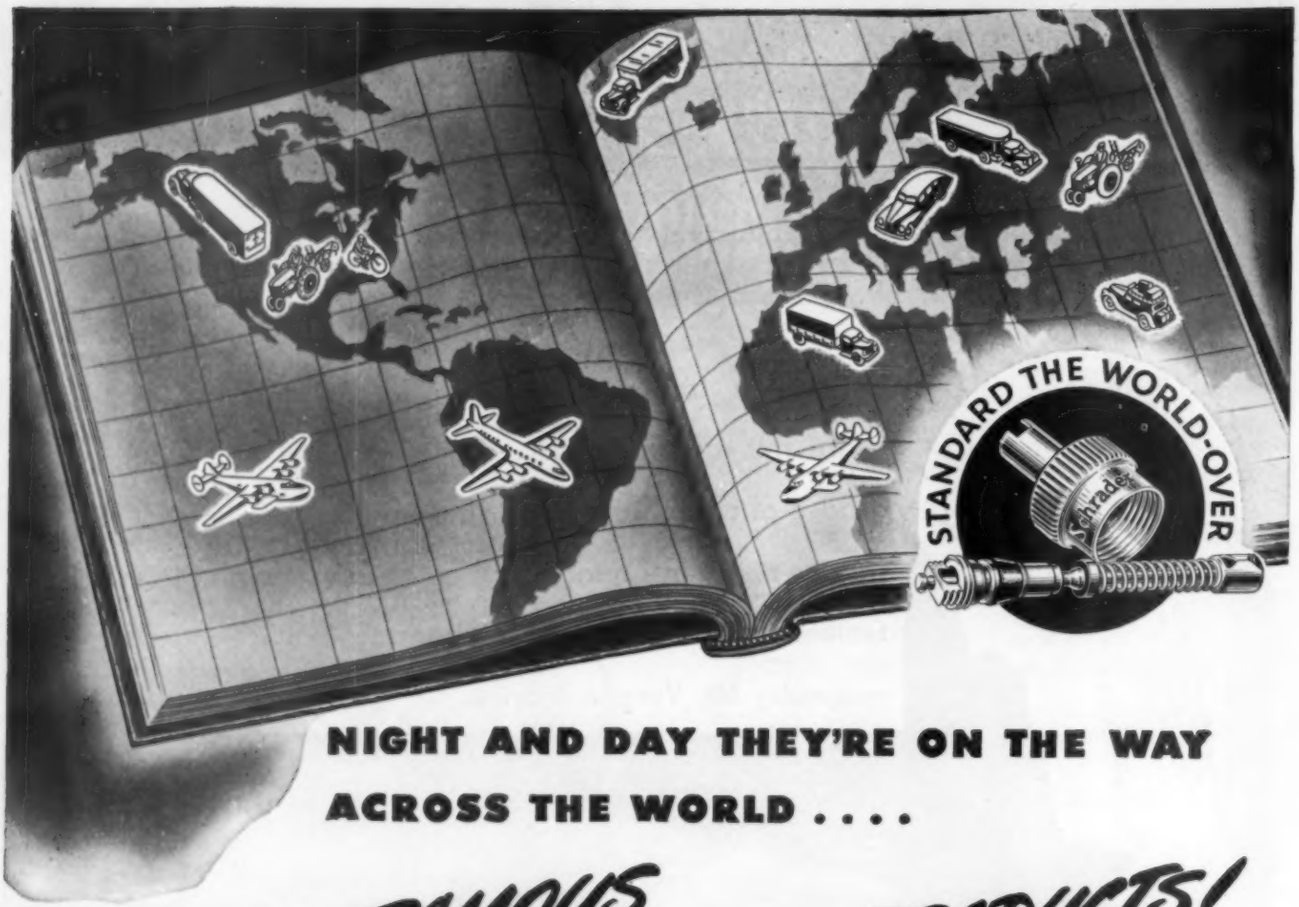


NIGHT AND DAY THEY'RE ON THE WAY ACROSS THE WORLD . . . .

WORLD FAMOUS SCHRADER PRODUCTS!

● 24 hours a day, 365 days a year, in every country in the world, Schrader Products are serving the transportation industry, the motoring and bicycling public, and the farmer.

The motor freight that rolls along the Alaskan Highway, the taxi that chugs up the Khyber Pass, the plane that soars over the Andes, and the tractor that pulls the plow across our own country's far-flung acreage all depend on Schrader precision-engineered valves and accessories for top tire performance and economical operation.

Scientifically-built Schrader Cores make tire valves absolutely air-tight under every operating condition . . . and neither the incessant pounding of a truck tire over rocky terrain nor the sudden impact of a plane's tire on the concrete runway can budge a Schrader Cap once it's put on finger-tight.

Similarly, the accuracy of Schrader Gauges, the efficiency of Schrader Vulcanizers, the durability of all other Schrader Tire Valve Tools and Equipment have won the respect and admiration of jobbers, dealers and users alike.

ONE SOURCE **Schrader** PRODUCTS CONTROL THE AIR ONE RESPONSIBILITY

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Inc.,* **BROOKLYN 17, N. Y.**

ORIGINATORS OF THE COMPARATIVE AIR LOSS SYSTEM FOR FLAT TIRE PREVENTION

RESINEX

Economy with Availability

This polymerized aromatic resin series may well bring you relief from shortages of supposedly "essential" ingredients for your compounding needs today. . . . The RESINEX series can help ease the pressure of mounting production costs by giving you an extender for —

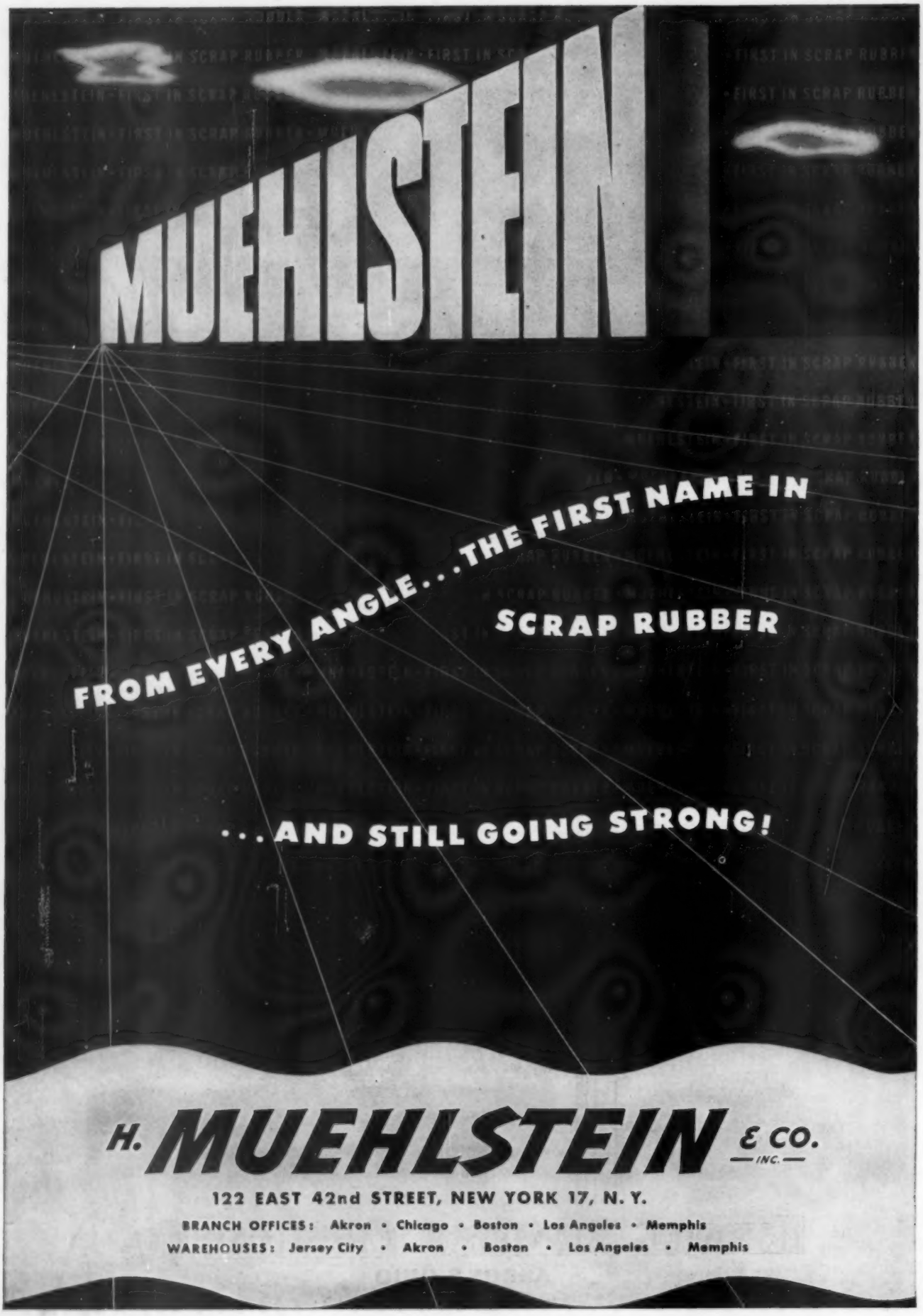
- Faster and easier incorporation in open mill or Banbury mixing.
- Better pigment dispersion and smoother stocks.
- Improved resistance to flex-cracking and cut-growth.
- Higher tensile with better elongation and tear properties.
- Smoother extrusion.
- Better mold flow with less sticking.
- Low cost with immediate availability for all purposes.

RESINEX L-4, for instance, is being used in an increasing number of plants with results comparable with the best of the old-line rubber softeners. Write for laboratory bulletin showing comparative results between Pine Tar and RESINEX L-4. Also, ask for new bulletin: "Facing the Carbon Black Shortage With Resinex."

HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

Branches: Boston . . . Trenton . . . Chicago . . . Los Angeles


MUEHLSTEIN
FROM EVERY ANGLE...THE FIRST NAME IN
SCRAP RUBBER
...AND STILL GOING STRONG!
H. MUEHLSTEIN & CO. INC.
122 EAST 42nd STREET, NEW YORK 17, N. Y.
BRANCH OFFICES: Akron • Chicago • Boston • Los Angeles • Memphis
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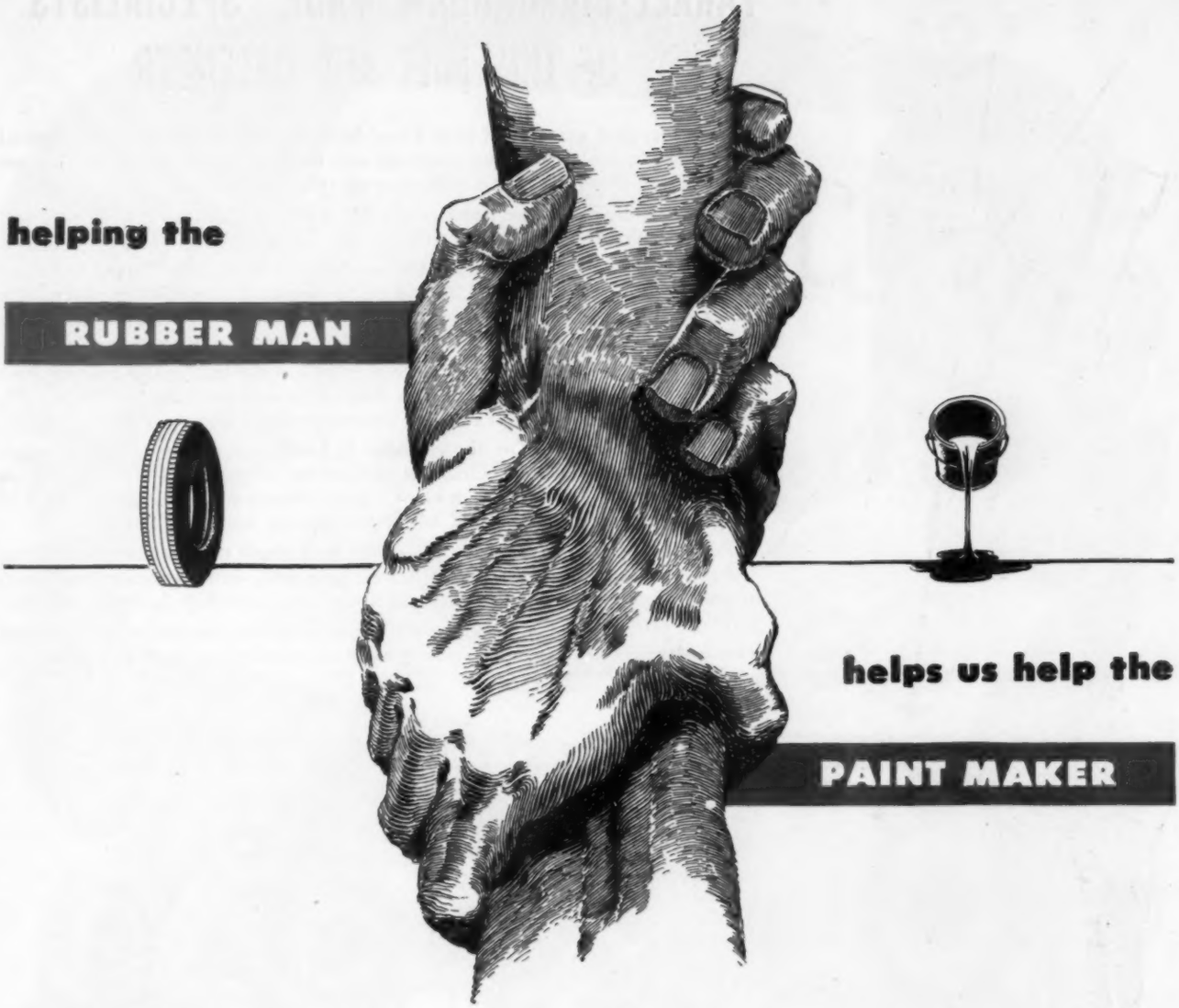
helping the

RUBBER MAN



helps us help the

PAINT MAKER

Whittaker gets to see—and solve—a lot of peoples' problems with minerals, colors, and pigments. And that puts Whittaker just a little ahead of the game when it comes to helping you. So often a situation in one field parallels a situation in another field. And Whittaker's right there to put two and two together. It's a sort of all-over background that gives more than quality and product control to the Whittaker products you buy. As problems come up—or right now, before they occur—get in touch with a Whittaker man; or write to Whittaker, Clark, and Daniels, Inc., 260 West Broadway, New York 13, N. Y.

...and you

ALUMINUM SILICATE • ASBESTOS • BARYTES • BENTONITE • BLACKS • BLANC FIXE • CALCIUM CARBONATE • CALCIUM HYDROXIDE • CALCIUM OXIDE • CALCIUM SULFATE • CHALK • CLAYS • COLORS • CHROMIUM OXIDE GREEN • DIATOMACEOUS EARTH • EARTH COLORS • GRAPHITE • HYDRATED LIME • IRON OXIDE • KAOLIN • LIME • LIMESTONE • MAGALITE • MAGNESIUM CARBONATE • MAGNESIUM OXIDE • LO-MICRON MAGNESIUM SILICATE • MICA • PARIS WHITE • PUMICE STONE • PYROPHYLLITE • RED OXIDE • SERICITE • SILICA • SLATE • SOAPSTONE • STEARATES • TALC • VENETIAN RED • WHITING • YELLOW OXIDE

WHITTAKER EST. 1890

MINERALS COLORS PIGMENTS

FARREL-BIRMINGHAM MADE "SPECIALISTS" OF THIS MILL AND CALENDER

how

Here is a typical example of how Farrel-Birmingham engineers applied special equipment to rubber working machines and designed a unit for processing another plastic material—in this case, phonograph record blanks.

The assembly illustrated consists of a 22" x 60" mill and a 14" x 44" two-roll calender with blanking attachment.

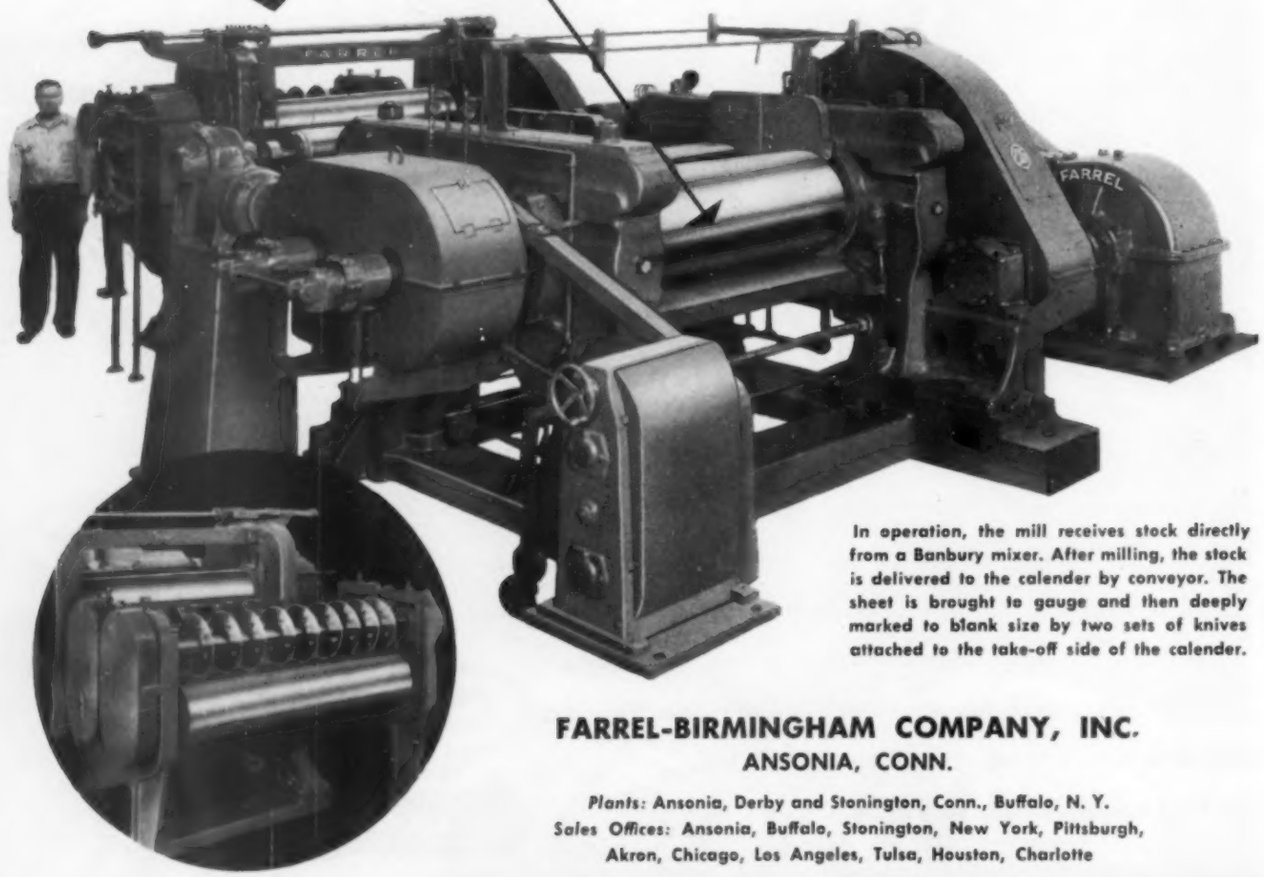
The rolls of both mill and calender are chilled iron, chamber-bored and fitted with rotary joints for the circulation of temperature regulating medium. The bronze-lined journal boxes are automatically lubricated. Drive and connecting gears have cut teeth and are bath lubricated in sheet steel guards.

Although the operator works on the fixed roll of the mill, gauge control is no problem because the roll adjustment is motor-operated and push buttons provide the means for moving either roll end independently or both together.

Top roll adjustment for the calender is hand-operated by ratchet through worms and worm wheels. Calender equipment includes a water-cooled feed table and, on the take-off side, a blanking attachment which consists of a set of longitudinal knives and a set of adjustable circular knives.

Power for the entire assembly is supplied by a single two-speed motor driving the mill through a right angle reduction gear unit, with variable speed units transmitting power to the calender and to the conveyor which feeds the calender.

Write for complete information and engineering help on roll mills, calenders or other rubber and plastics processing units for standard or unusual applications.



In operation, the mill receives stock directly from a Banbury mixer. After milling, the stock is delivered to the calender by conveyor. The sheet is brought to gauge and then deeply marked to blank size by two sets of knives attached to the take-off side of the calender.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte

Farrel-Birmingham

FB-387

A NEW LANDMARK IN

AERO BRAND STEARATES

SERVICE

Large-scale production, rigidly controlled from manufacture of the acid right through to final inspection, governs every step of AERO* BRAND STEARATES manufacture. The resulting AERO BRAND STEARATES . . . Calcium . . . Zinc . . . Aluminum . . . Magnesium . . . are recognized throughout industry for processing characteristics of uniform superiority . . . for fine texture . . . excellent lubricating and dusting qualities . . . on which efficient processing operations rely. For product quality . . . for service . . . for all-around dependability . . . it's CYANAMID AERO BRAND STEARATES.

CYANAMID'S MODERN FACILITIES BECOME YOUR DEPENDABLE SOURCE OF SUPPLY WHEN YOU SPECIFY...

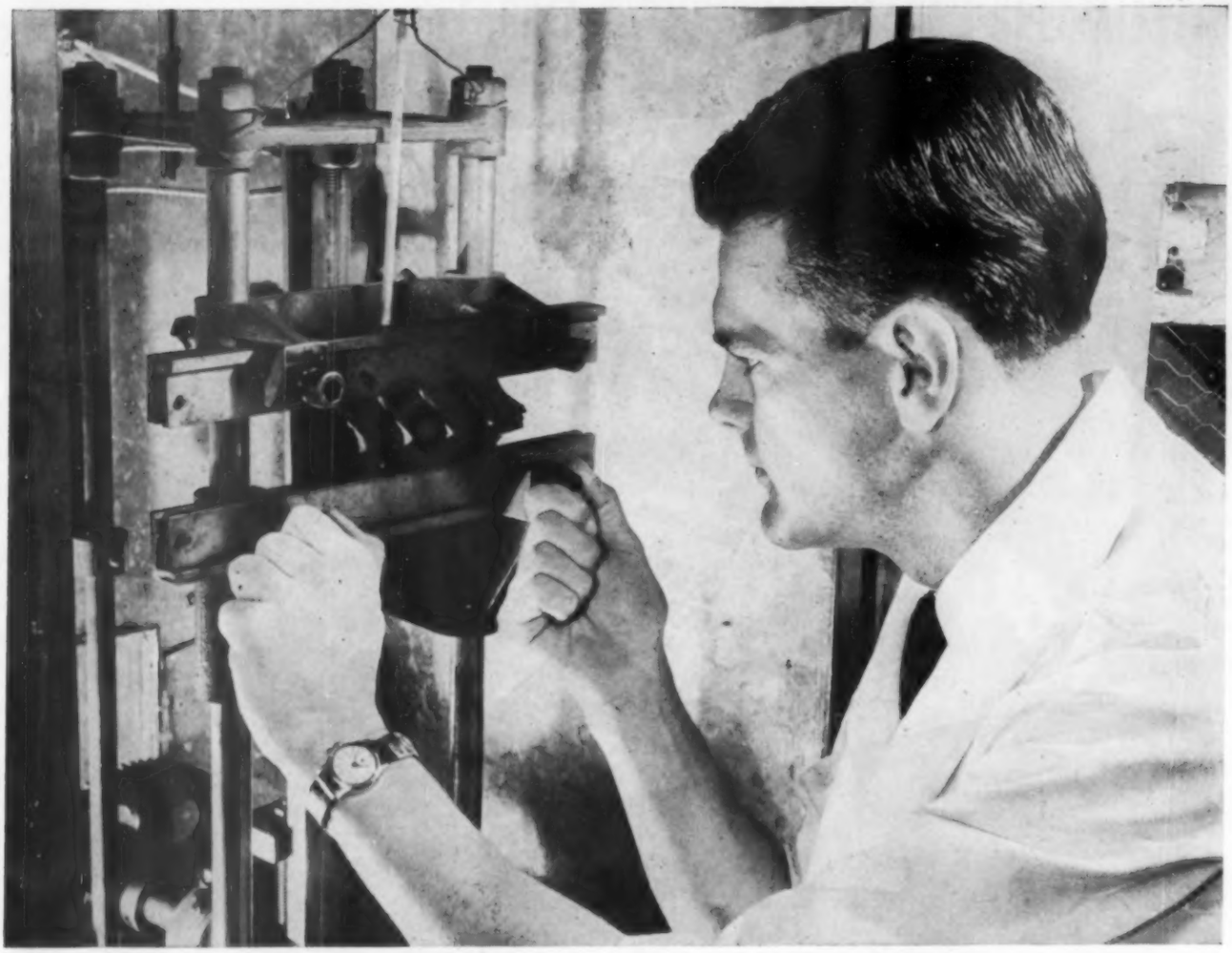
AERO BRAND STEARATES

Industrial Chemicals Division

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

*Trade Mark



YES, WE TEST FOR TOUGHNESS!

While our prime interest in rosin rubber is the production of Dresinate* 731—the essential emulsifier developed by Hercules in cooperation with the rubber industry — we are also concerned with the performance of the finished rubber formulations. Thus, our rubber laboratory is constantly engaged in producing, testing, and evaluating experimental copolymers made with this ingredient.

We welcome the opportunity of working with manufacturers of tires and other rubber products.

HERCULES POWDER COMPANY 918 Market Street, Wilmington 99, Del.

Photograph taken at the Hercules rubber laboratory.

HERCULES DRESINATE 731

THE EMULSIFIER THAT MADE ROSIN RUBBER

*Reg. U. S. Pat. Off. by Hercules Powder Company

R7-4

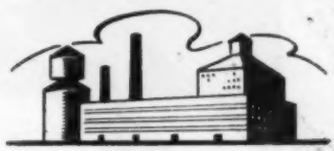
Rubber-Flo IS THE ANSWER FOR KEEPING MOLDS CLEAN...

Rubber-Flo MOLD LUBRICANT WILL HELP YOU "LICK" YOUR PRODUCTION PROBLEMS

PLANT "A"

Plant "A" manufactures mechanical rubber goods. Production is unsteady . . . maintenance costs are high. Factory records show that several times a month, sometimes once a week, the molds are shut down and allowed to cool so that they can be cleaned. Plant "A" is losing production because an ordinary mold lubricant won't keep the molds clean.

PLANT "B"



Plant "B" manufactures rubber soles and heels as well as mechanical rubber goods. Their production, too, was uneven . . . showed ups and downs . . . until a chemist suggested **RUBBER-FLO** Mold Lubricant to keep the molds clean. Now, after a full year's operation, the molds are still clean, *with not a single shut-down!*

- *Rubber-Flo* is SAFE! It is a non-toxic, odorless mold lubricant.
- *Rubber-Flo* is QUICK! It may be sprayed, brushed or dripped onto the mold. It will not clog a spray gun.
- *Rubber-Flo* is ECONOMICAL! The savings in maintenance more than pays for it.
- *Rubber-Flo* is LOW IN COST! It comes in concentrated form and is diluted with water for use.

For softening synthetic and natural rubber use *RUBBER-SOL*

RUBBER-SOL is a safe, non-toxic, non-explosive liquid.

RUBBER-SOL removes rubber, gum, varnish, paint and carbon from metal without any harm to the metallic surface.

PREVENTIVE MAINTENANCE COMPANY

1997 FAIRFIELD AVE. BRIDGEPORT 5, CONNECTICUT

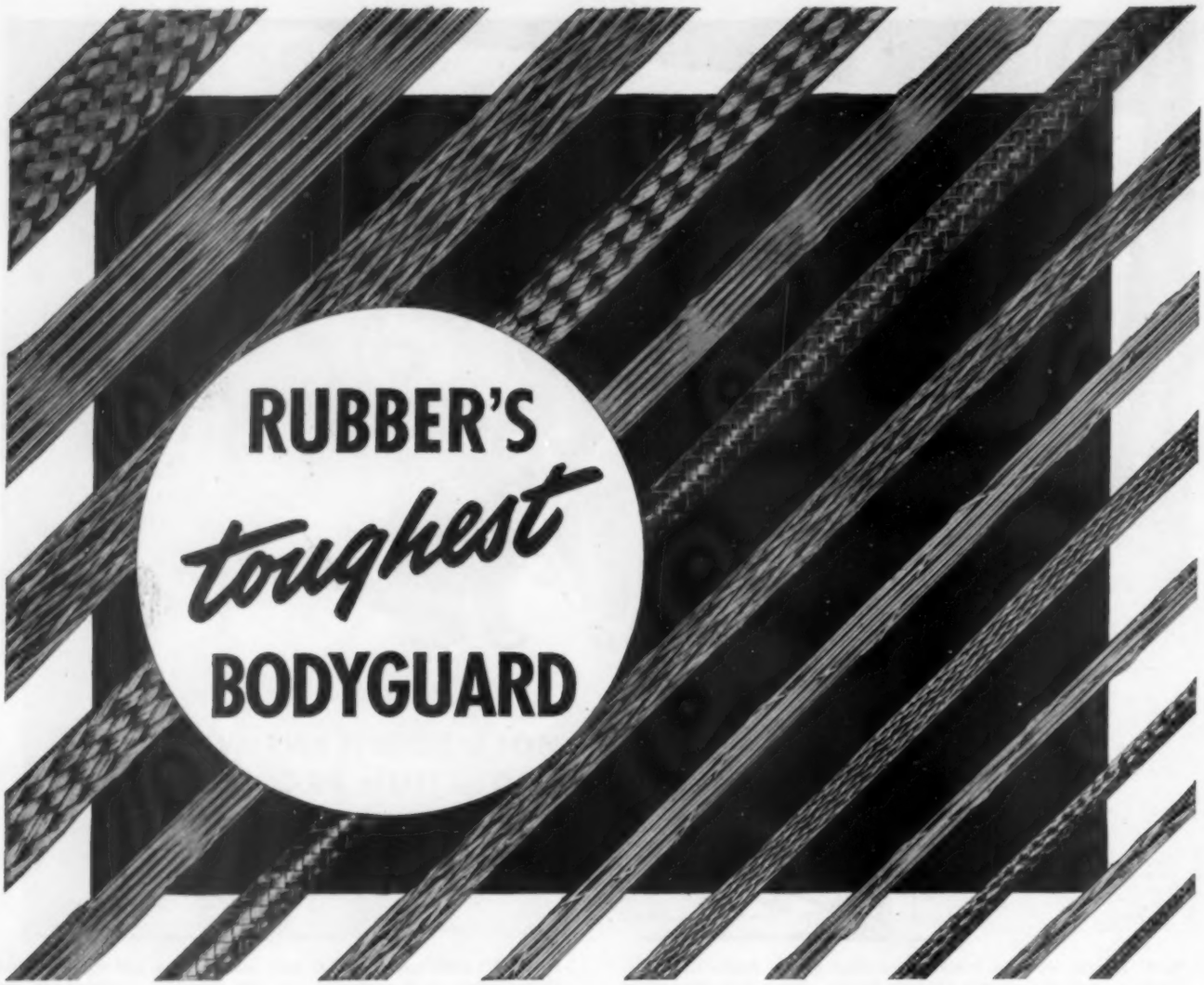
Mail this coupon today for a free sample and further information

Name

Address

Without obligation to me, please send further information and samples of

○ *Rubber-Flo* ○ **RUBBER-SOL**



ALMOST 40 years ago we started a job here at National-Standard that's grown bigger and bigger with each passing year. That job is the application of fine wire to rubber—to support rubber and greatly extend its usefulness . . . to give rubber products unprecedented strength and life.

Today you have only to look at the amazing work records of wire-reinforced products to realize that wire has become rubber's toughest, most capable bodyguard—in tires, V-belts, flat belts, conveyor belts, tubes, conduit, hose, and scores of other products.

The tubular and flat braids, tapes and metallic strands shown above are just a few of the fine wire structures specially engineered by National-Standard for these and many more wire-and-rubber applications—painstakingly developed and precision-produced to help make new and improved products practical and profitable for manufacturer and user alike.

As always, we at National-Standard welcome the opportunity to work with you in the planning of your products. Perhaps you too stand to gain with a specially developed wire or fabrication. Possibly we can also contribute in the development of cost-saving machinery for the application of your wire. In any case, our specialized engineering service is at *your* service, now, or at any time.

NS
NATIONAL-STANDARD Division
NATIONAL-STANDARD COMPANY

DIVISIONS OF NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD
Niles, Mich.
Tire Wire, Fabricated Braids and Tape

ATHENIA STEEL
Clifton, N. J.
Flat, High Carbon, Cold Rolled Spring Steel

WORCESTER WIRE WORKS
Worcester, Mass.
Round Steel Wire, Small Sizes

WAGNER LITHO MACHINERY
Jersey City, N. J.
Lithographing and Special Machinery

They said it couldn't be done...

Photo courtesy The Ohio Chemical Co.

So we did it!

WHEN specifications for this high altitude oxygen mask were set up, many "experts" in the use of latices and mixes said flatly that the job couldn't be done with latex. The intricate system of ducts, the metal insert in the nose piece, the rigid tolerances, they claimed, were just too much to expect from a water system.

So . . . American Anode researchers and engineers went ahead and did it—produced the forms, engineered the production, and helped turn out finished masks by the millions.

It's typical of the many "impossible" jobs that we have taken on for our customers and prospects. And we believe that it proves that the possible uses for latices and mixes are practically limitless.

Do you have an idea for a new product that you don't know how to produce? We're not miracle workers, but we believe that we'll come closer to working miracles with latices than anyone else in the country. That's why we offer you the services of our research and technical staff to help you with any product or problem which you may now have.

Latices and compounded mixes of GEON, HYCAR, Saran, neoprene, crude rubber, and GR-S are available. For more information about these modern materials and *methods for using them,* please write Dept. AG-3, American Anode Inc., 60 Cherry Street, Akron, Ohio.

AMERICAN ANODE

INCORPORATED

CRUDE AND AMERICAN RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

Good news does travel quickly!

Want to prove it?

All you have to do is drop in to our offices and see the flood of inquiries we've received by mail, telegram and phone—since our announcement a few weeks ago of

FLAKED MINERAL RUBBER

Seems as if the whole industry has need of this important new development. How about you?

BASIC FACTS

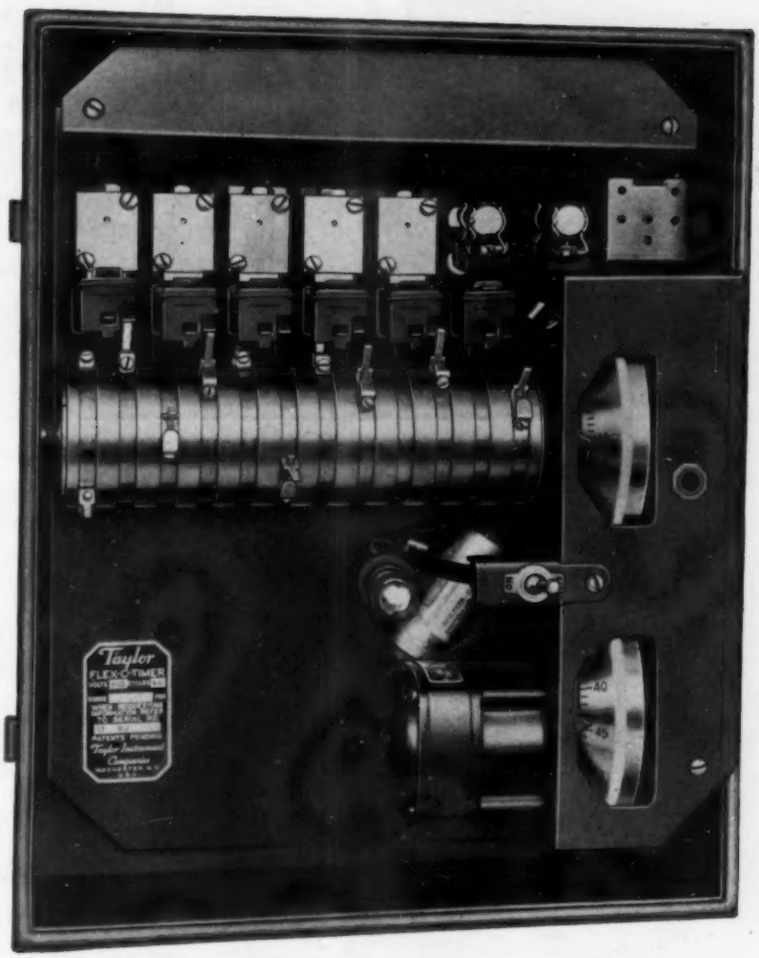
Uniform melting point.
Rapid assimilation.
Good dispersion.
No contamination.
Convenient 50 lb. bags.

HERRON BROS. & MEYER

82 BEAVER ST., NEW YORK 5, N. Y.
516 OHIO BUILDING, AKRON, OHIO
SUPPLIERS OF RUBBER CHEMICALS

COMPETITION
rearing its ugly head?

YOU don't have to be scared of competition if you keep quality up and costs down. And that's a lot easier than it sounds—if you have a Taylor Flex-O-Timer on the job! This versatile instrument takes complete charge of any rubber molding process—whether it involves platen presses, tire presses, or the more complicated vulcanizer installations. All the operator has to do is load the press and push a button to reproduce any ideal schedule *accurately* every time!



Here are some of the things a Flex-O-Timer will give you:

Pneumatic and/or electric operations.

Instantaneous starting by means of a latch-trip solenoid mechanism.

Completely automatic operation from the second the button is pushed until the press opens for next load.

Fully adjustable actuating pins so that the lengths of each period in the sequence can be varied.

Wide variety of time bands to fit any schedule.

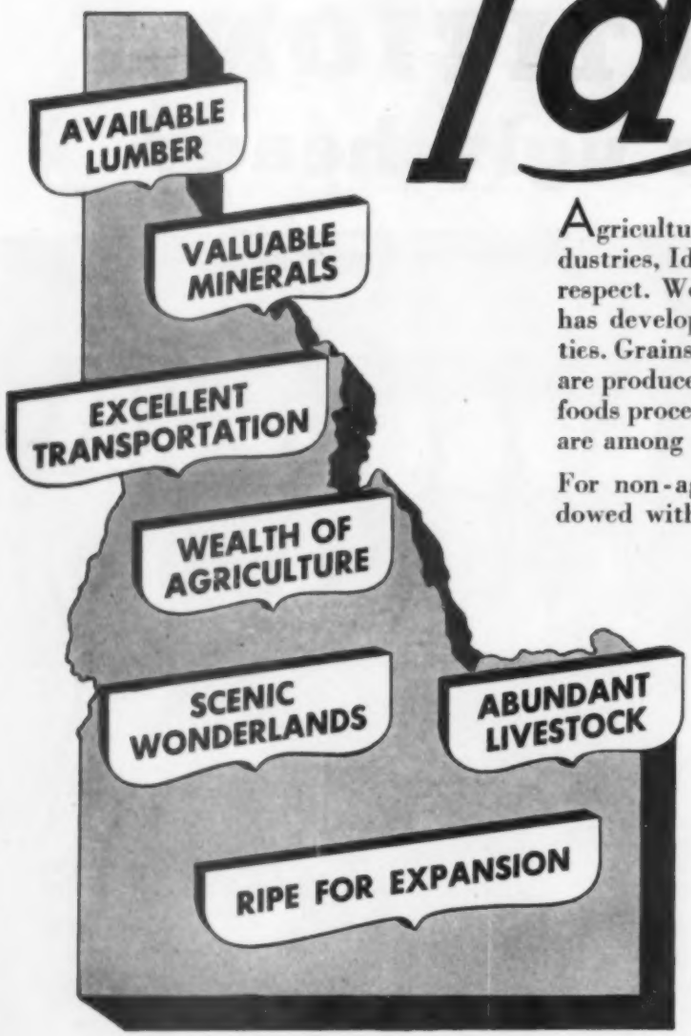
For complete details write today for Catalog No. 98154 which tells the whole Flex-O-Timer story. We're ready to help you beat rising costs with Taylor Accuracy. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Idaho*

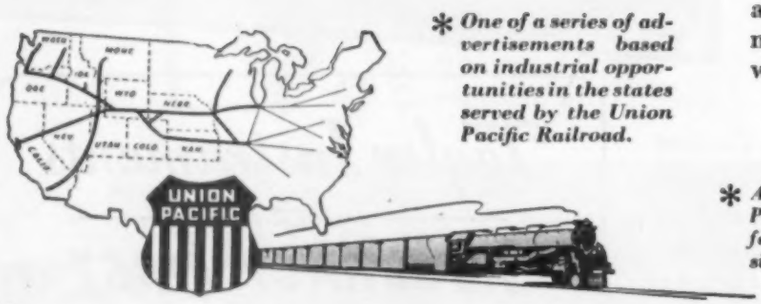


Agriculture being the life-blood of many industries, Idaho is particularly fortunate in that respect. World-famous for the Idaho potato, it has developed many other agricultural activities. Grains, vegetables, fruit... cattle and sheep are produced in abundance. Dehydration, frozen foods processing, dairying, canning and packing are among the state's flourishing industries.

For non-agricultural industries, Idaho is endowed with rich veins of minerals. Numerous manufacturers of stone, clay and glass products have established plants in Idaho. Lumber for building and wood products is available. Unsurpassed rail transportation is provided by Union Pacific.

As a vacation region, Idaho has a wonder-world of its own in Sun Valley . . . year-'round sports center... the world famous primitive area . . . and in the scenic surroundings of Payette Lake.

Idaho is a young thriving state, ripe for further industrial development. It offers good living and working conditions, good schools, splendid cultural advantages... and its energetic citizens assure newcomers of a true western welcome.

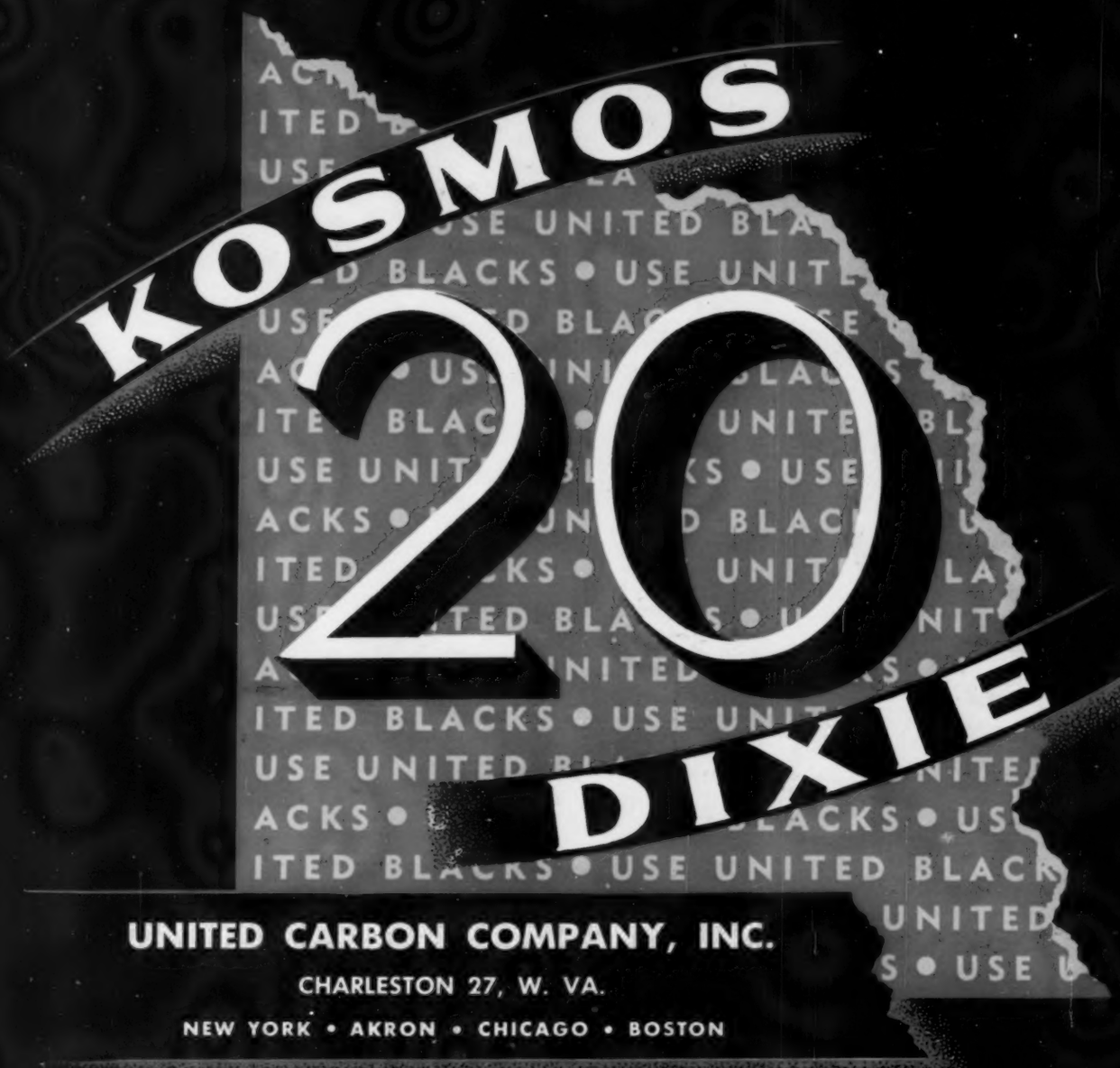


* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE



UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

USE UNITED BLACKS • USE UNITED BLACKS • USE UNITED BLACKS •

★ *A smooth, stable,* **DUSTLESS** *dispersion of* **ZINC STEARATE** *in water in concentrated form*

AQUAZINC

NO DUST . . . HEALTH INSURANCE FOR YOUR PERSONNEL

ATTENTION, manufacturers of milled stock, rubber compounds, molded goods, coated fabric and paper, Butyl rubber, latex and cements. Aquazinc is economical and efficient to use. It can be applied with uniformity and with no loss. It eliminates dust, inconvenience, fire hazard, and other difficulties accompanying the use of powdered Zinc Stearate.

AQUAZINC is particularly convenient for surface application of Zinc Stearate. When diluted with 8 to 20 parts of water, it can be applied by spray or bath.

THE BEACON COMPANY

PURITY · UNIFORMITY · DEPENDABILITY

Chemical Manufacturers

97 BICKFORD STREET · BOSTON, MASSACHUSETTS

In Canada: PRESCOTT & CO., REG'D., 774 ST. PAUL ST. W., MONTREAL

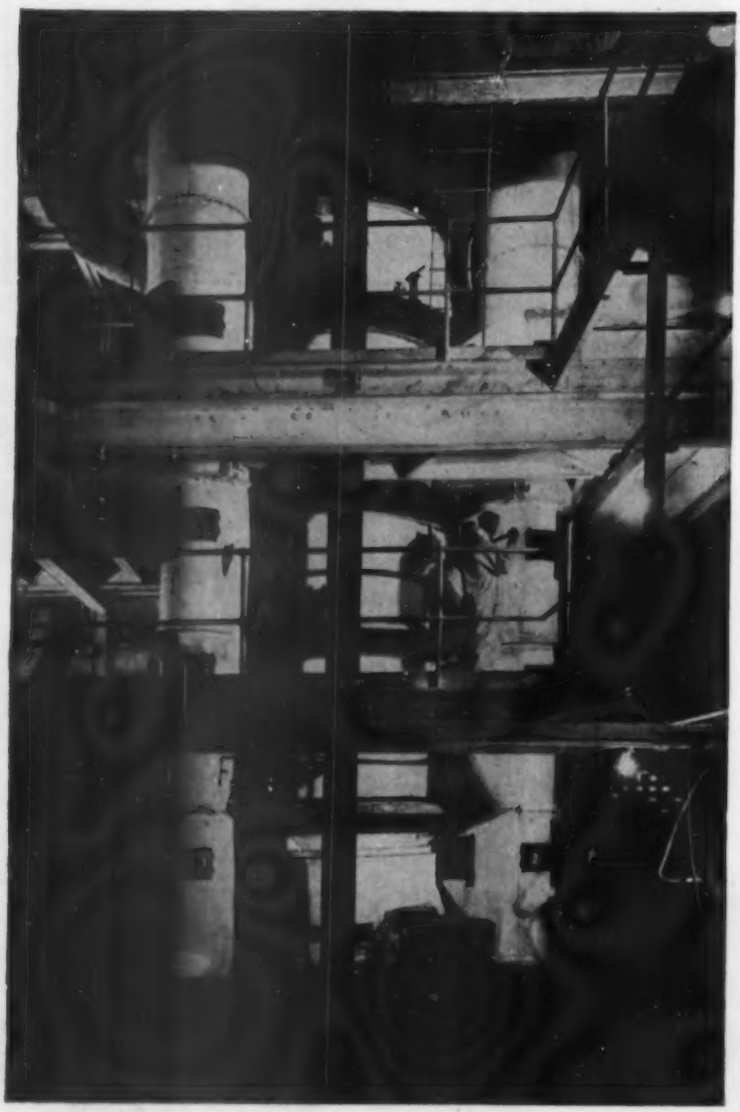
ST. JOE lead-free ZINC OXIDES

• • • MADE BY A PATENTED ELECTRO-THERMIC PROCESS • • •

why

THE FLEXIBILITY OF THE PROCESS IS VALUABLE TO CONSUMERS

PARTIAL VIEW OF ELECTRO-THERMIC FURNACE—These furnaces are about as high as a four-story building, 37 to 40 feet overall, with an inside diameter of 69 inches.



The Electro-Thermic Process — exclusive with this Company—enables our metallurgists not only to produce zinc oxides of exceptional purity and uniformity, but to exercise close control over the size and shape of the constituent particles. Thus the consumer is assured of the precise type required for his individual needs.

Wide selectivity in size and shape of zinc oxide particles is but one phase of the broad service we offer to consumers.

St. Joe lead-free Zinc Oxide is warehoused in all principal cities. From our centrally located smelter at Josephtown, Pa., we ship direct to the principal consuming centers.

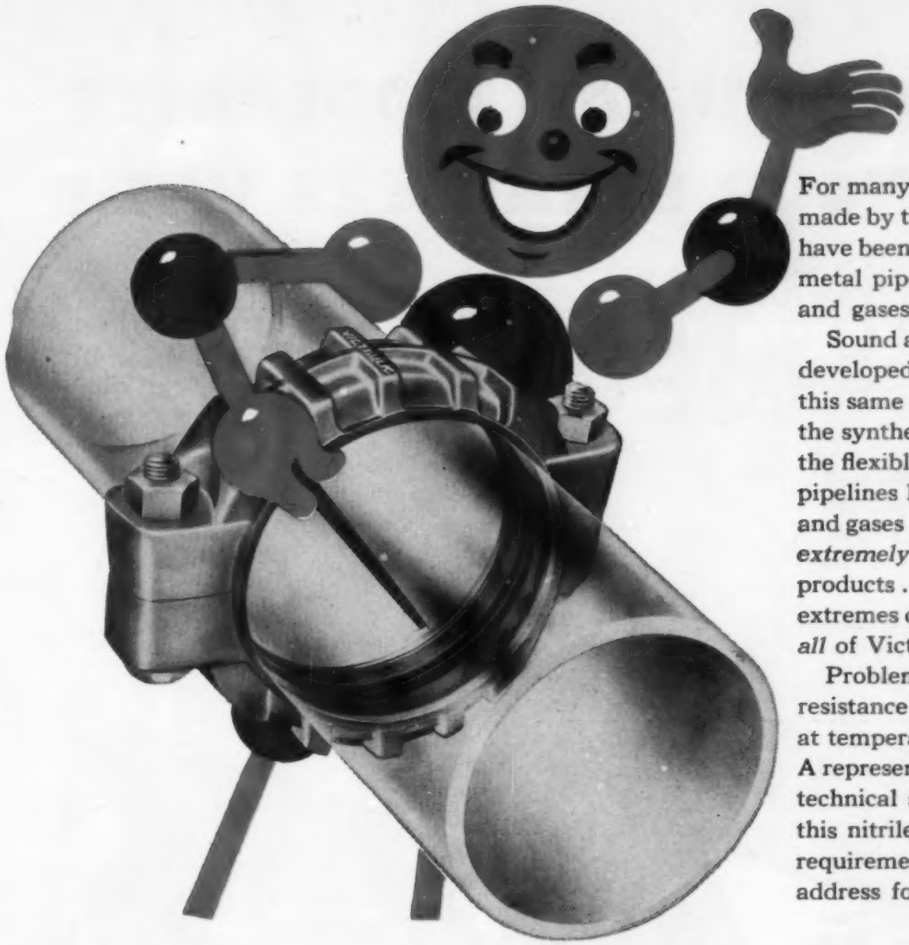
ST. JOSEPH LEAD COMPANY

250 PARK AVENUE
NEW YORK 17

•

ELDORADO 5-3200

PLANT AND LABORATORY, JOSEPHTOWN, BEAVER COUNTY, PENNSYLVANIA



For many years Victaulic Pipe Couplings made by the Victaulic Company of America have been noted for *flexibility* in joints of metal pipelines that handle liquids and gases.

Sound and ingenious engineering developed the Victaulic Coupling . . . and this same engineering chose Perbunan for the synthetic rubber gasket that triple-seals the flexible Victaulic Couplings used in pipelines handling petroleum liquids and gases . . . because Perbunan *rates extremely high* in resistance to petroleum products . . . maintains flexibility under extremes of heat and cold . . . in fact, meets *all* of Victaulic's service requirements!

Problems involving flexibility and resistance to oil, abrasion or deterioration at temperature extremes call for Perbunan. A representative will gladly explain the technical services available to help adapt this nitrile rubber to your processing requirements. Please write to the nearest address for further information.

Perbunan is ideal...for a triple-sealing gasket in a flexible metal pipeline!

PERBUNAN
REG. U. S. PAT. OFF.

THE RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

ENJAY COMPANY, INC. (formerly Chemical Products Department, Stanco Distributors, Inc.) 26 Broadway, New York 4, N. Y.; First Central Tower, 106 South Main Street, Akron 8, Ohio; 221 North LaSalle St., Chicago 1, Illinois; 378 Stuart Street, Boston 17, Massachusetts. West Coast Representatives: H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in Elizabeth, New Jersey; Los Angeles, California; Chicago, Illinois; Akron, Ohio; and Baton Rouge, Louisiana.

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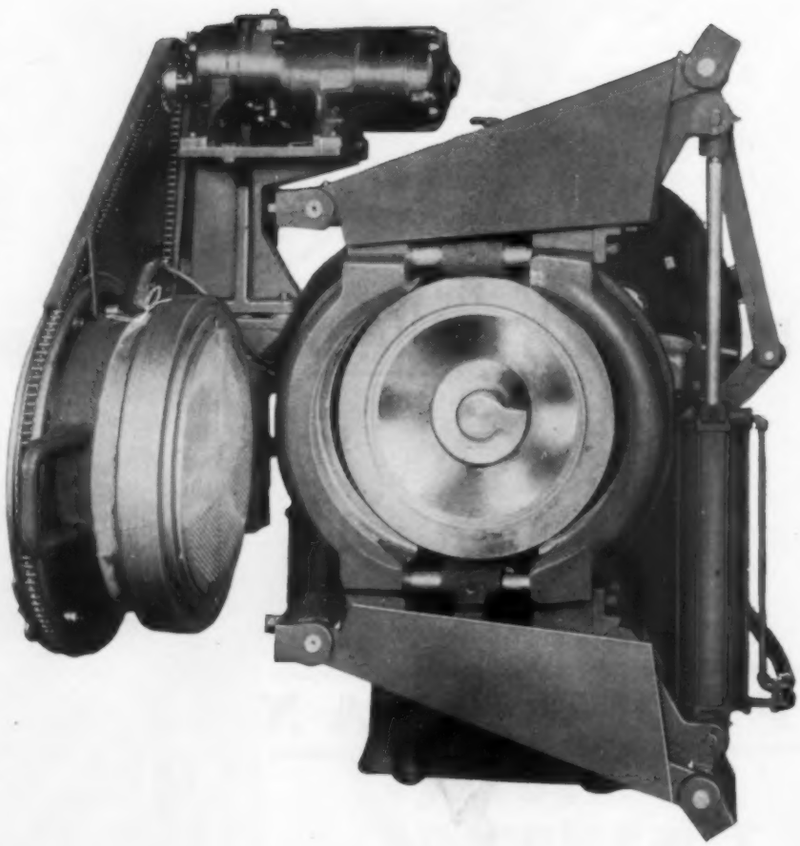

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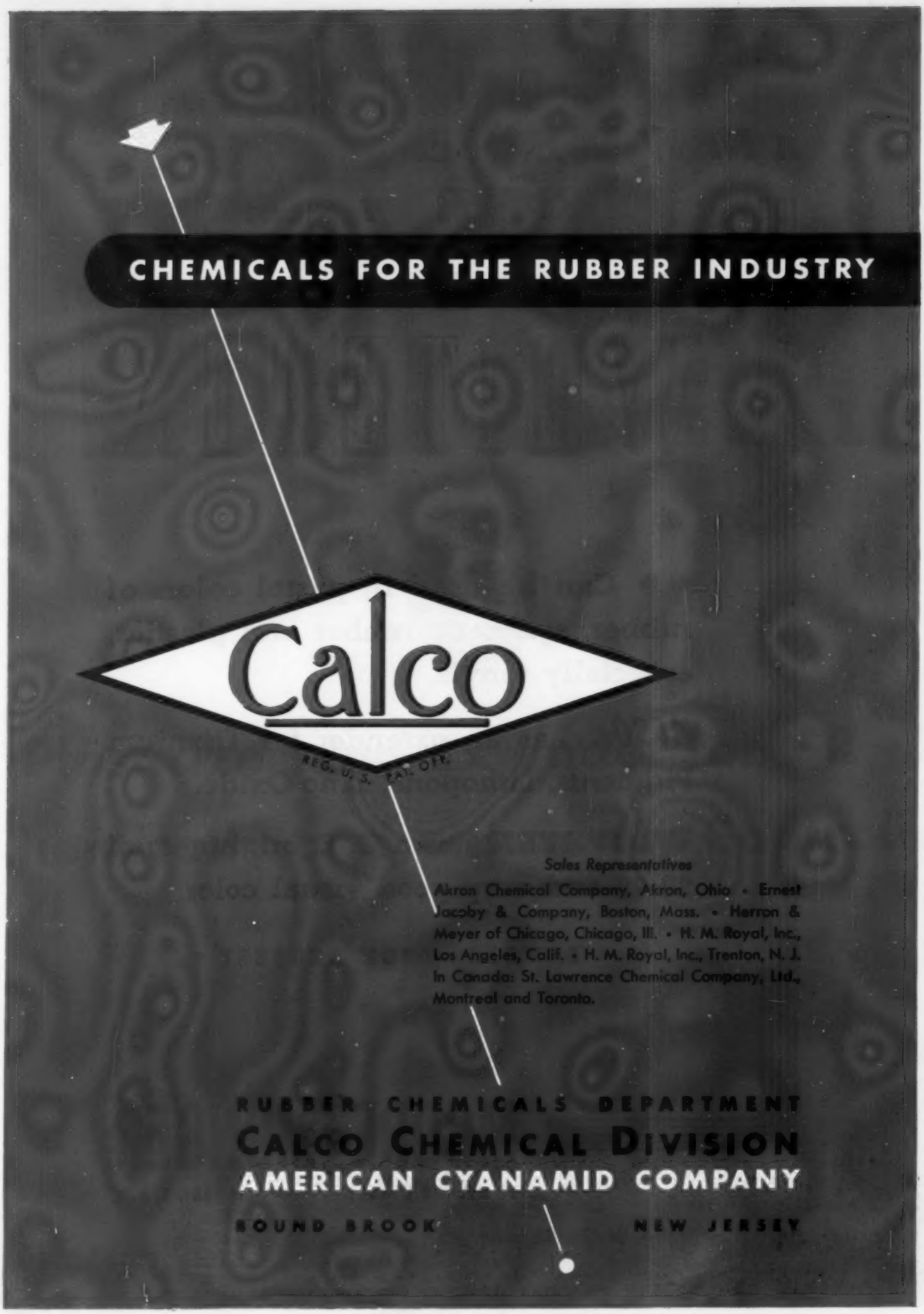
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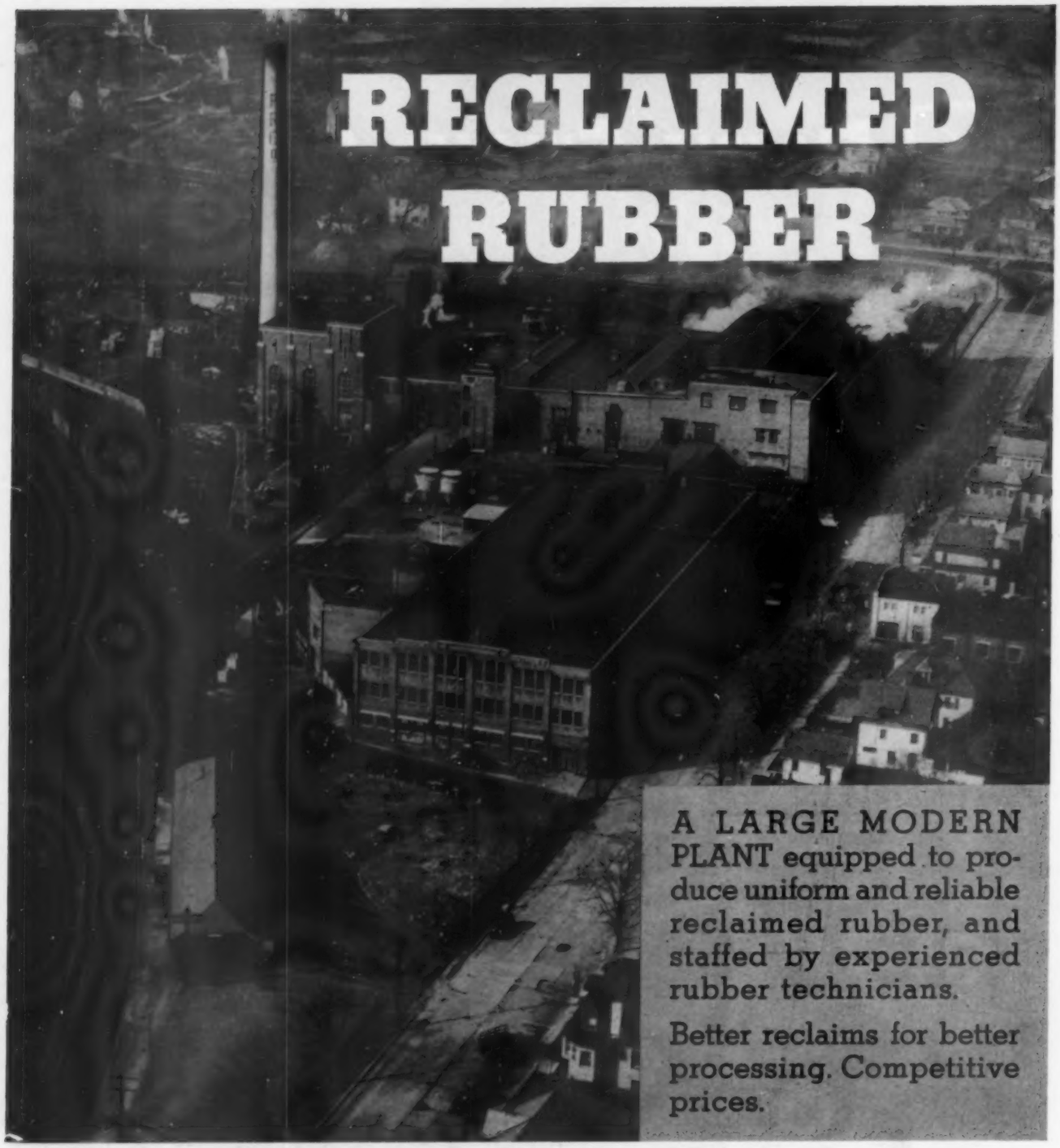
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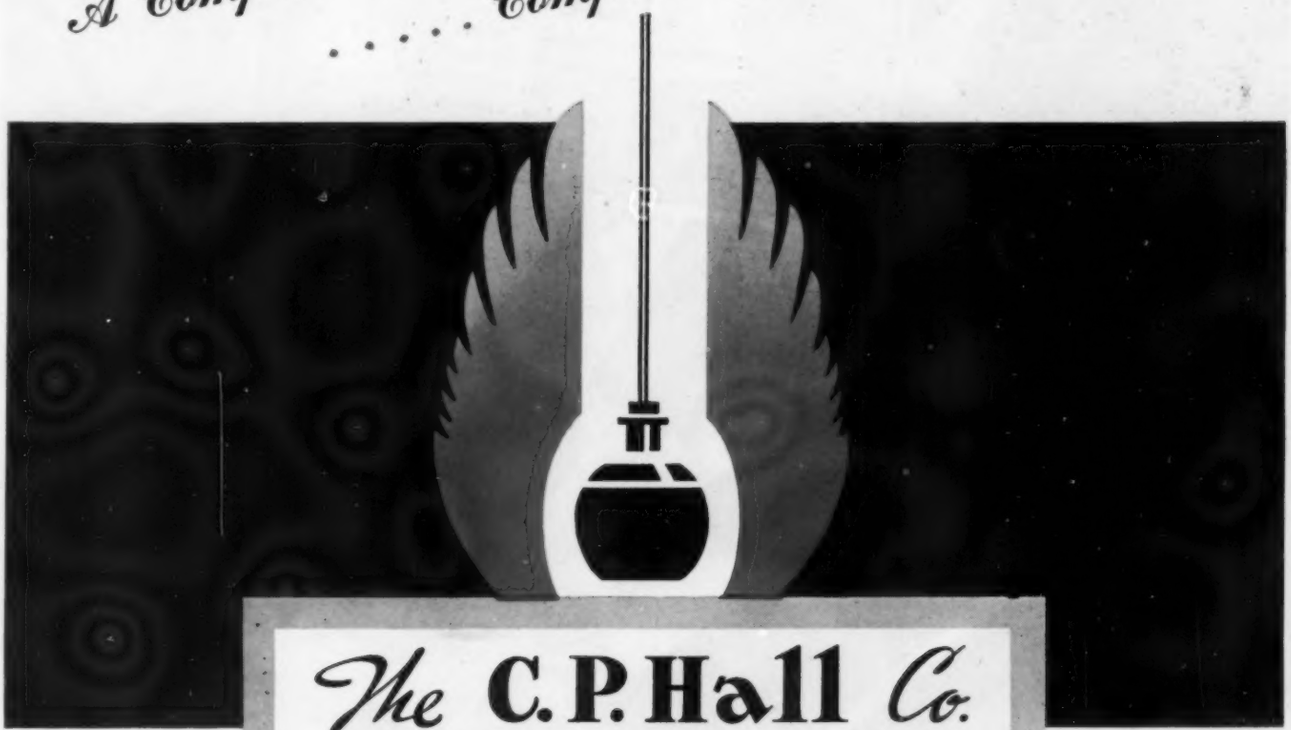

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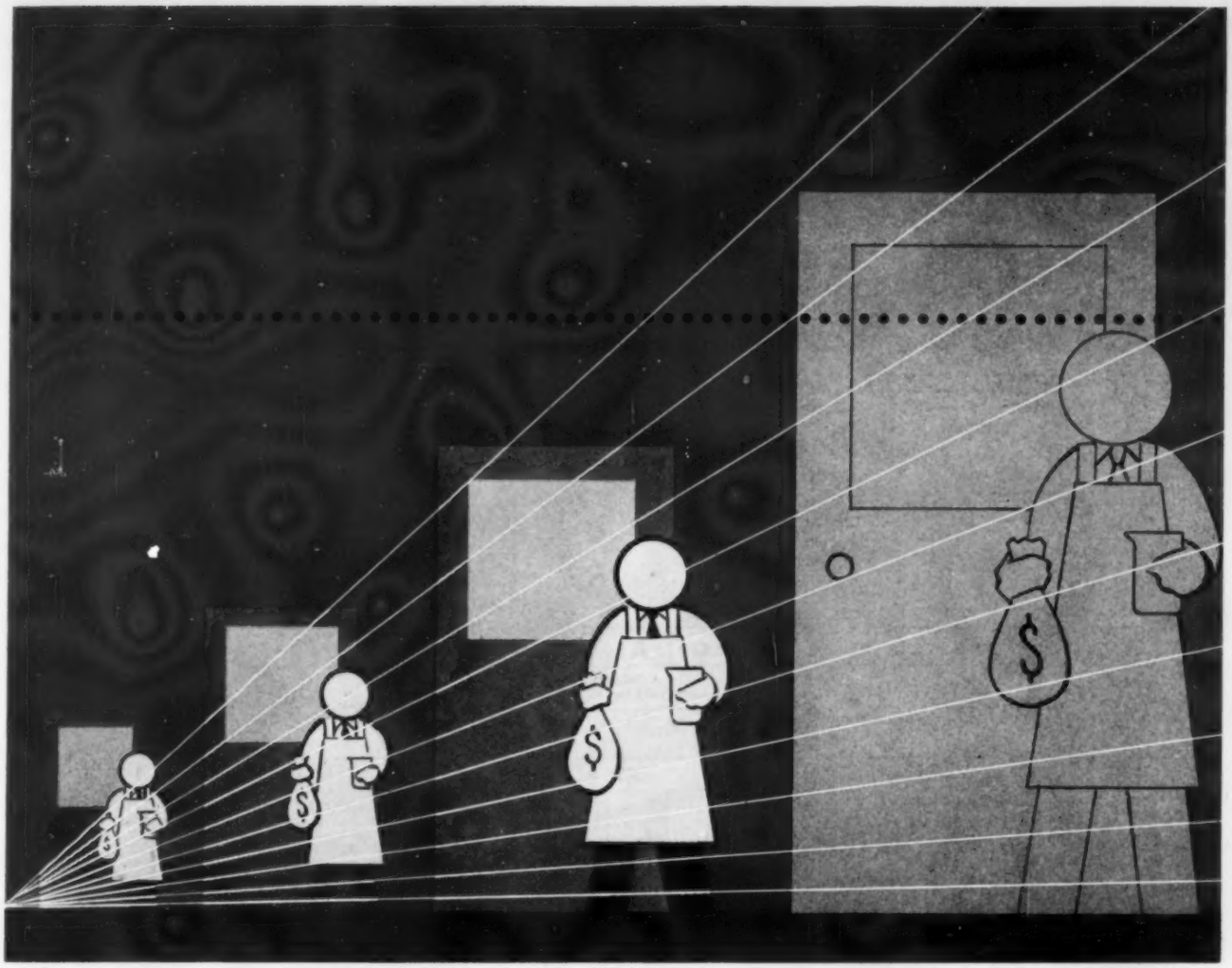

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Technical Bulletin No. 32 — on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

Experimental Polymer XP-8 with 100 Parts of Zinc Oxide

XP-8 is defined by *Office of Rubber Reserve* as follows:

Monomers—	*Butadiene* 70
	Dichlorostyrene 30
Formula—	*Activated—low soap*
Modifier—	*Sulfole DDM Mixture*
Temperature—	*95° F.*
Mooney Plasticity—	*69*

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Polymer	100.0
Sulfur	2.5
"El-Sixty"	1.5
"Monex"	0.2
Coumarone-indene Resin	7.5
E.L.C. Magnesia	5.0
ZINC OXIDE	100.0

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of: 200%	300%	400%	500%	Permanent Set	Shore Hardness	Tear Resistance Tested at: Room Temp.	100°C.
XP-8										
4	3100	760	235	275	390	590	.28	50	70	36
7.5	3200	710	265	305	455	725	.25	51	75	38
15	3040	690	270	310	460	770	.21	51	75	38
30	2680	670	270	350	505	775	.20	51	78	39
45	2580	670	275	350	470	785	.17	51	74	37
60	2480	640	275	315	470	745	.16	51	78	38
90	2520	670	270	350	465	700	.16	51	75	39
GR-S										
4	1470	610	225	380	530	795	.23	50	65	34
7.5	1455	590	225	335	525	860	.21	50	62	34
15	1300	560	230	305	495	800	.19	50	60	32
30	930	510	235	350	545	855	.13	50	57	31
45	1115	535	230	345	540	845	.14	50	55	29
60	1195	550	225	335	485	825	.15	50	56	29
90	1130	540	265	340	490	865	.14	50	55	30

Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum: Indentation in mm.	Per Cent Rebound	Shore Hardness	Compression Fatigue (Goodrich Flexometer)*: Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression: Initial	Final	Cut-Growth Resistance Tested at 70° C. Inches Failure: 300 Cycles	1000 Cycles
XP-8										
60	7.47	60.6	51	25.7	15'-2.9	31.6	15.4	17.9	.34	.78
GR-S										
60	7.64	61.2	49	27.5	18'-4.8	36.8 (At 15' 35.4)	16.1	23.0	.52	—

* Test Conditions: 143 Lb. Load. 0.175" Stroke. 100° C. Oven Temp.

XP-8 gives, with Zinc Oxide, the highest tensile results obtained to date with any modification of the GR-S type polymer. The modulus at 300% elongation follows standard GR-S quite closely, as does the permanent set at break. However, *XP-8* is appreciably better in tear resistance at both room temperature and 100°C. The pendulum rebound of *XP-8* is slightly lower than Standard GR-S, but the heat generation is somewhat better. The cut-growth resistance of *XP-8* is distinctly better than Standard GR-S.

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634½
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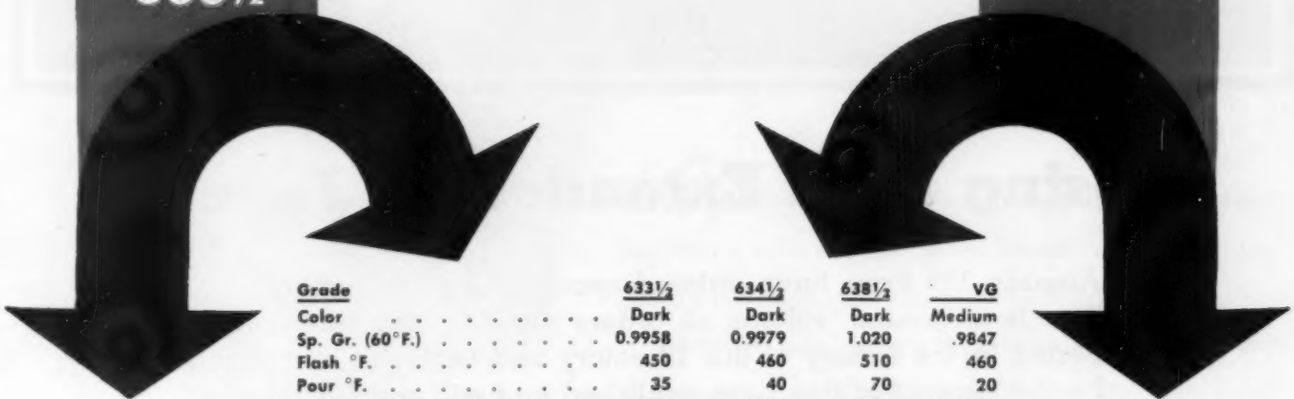
VG



Grade	633½	634½	638½	VG
Color	Dark	Dark	Dark	Medium
Sp. Gr. (60°F.)	0.9958	0.9979	1.020	.9847
Flash °F.	450	460	510	460
Pour °F.	35	40	70	20
Viscosity 210°F., Saybolt sec.	110	125	510	103
Viscosity Index	−109	−130	−365	−110
Dist. (1 mm)°F.				
5%	405	409	498	430
30%	442	445	540	458
Evap. Loss mg/10g. (1 hr. oven 100°C.)	5	5	3	4

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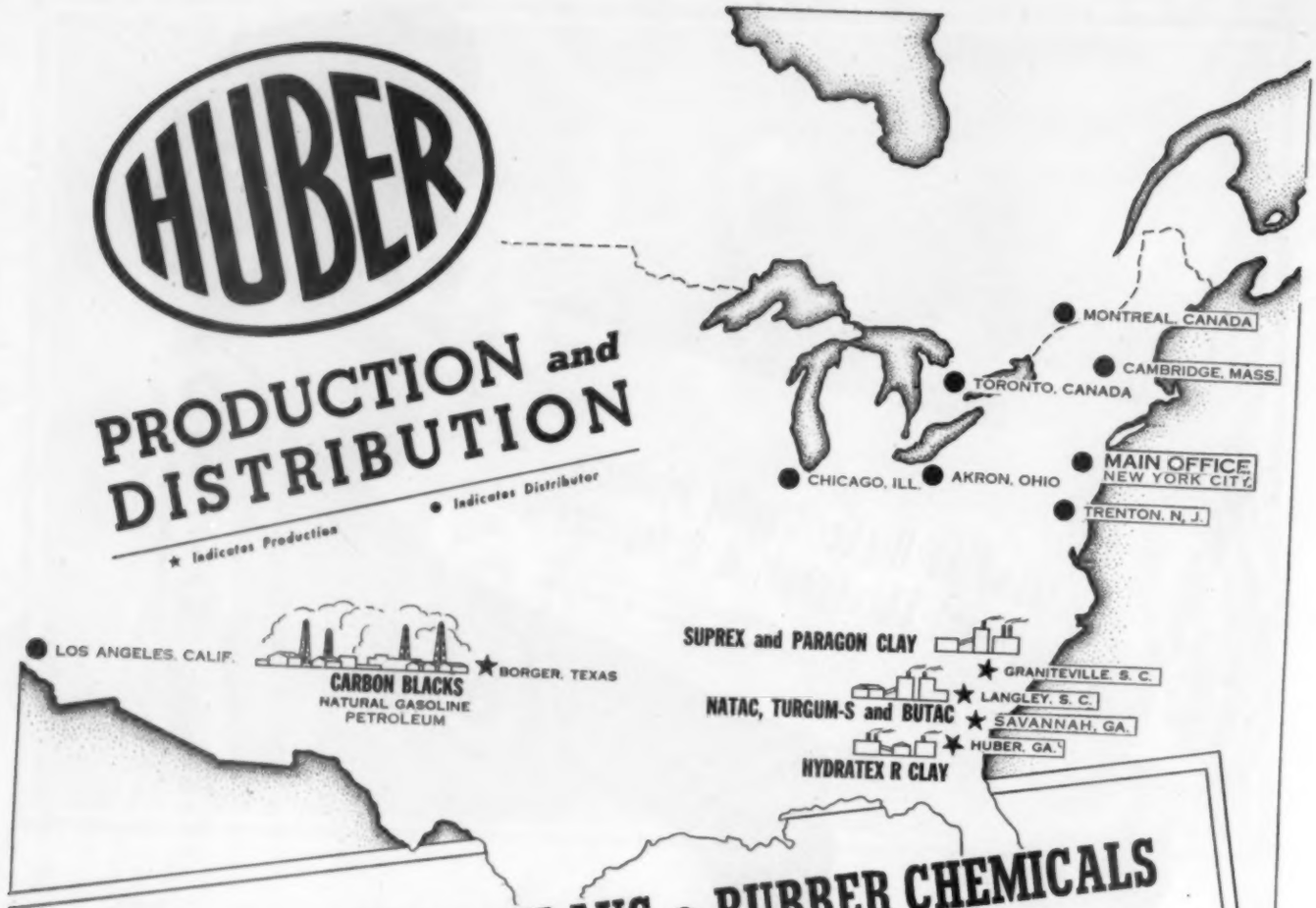

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RUBBER AGE

Vol. 61, No. 2 MAY, 1947

Applications for Neoprene Latex

By R. H. WALSH

Rubber Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Del.

WHEN the Japanese occupation of the rubber-growing countries abruptly terminated the supply of rubber latex, the only material available in sufficient quantities for substitution was neoprene latex. A great deal of work was promptly initiated to adapt this product to the manufacture of many products normally made of rubber latex, and most of the thinking behind this conversion was in the direction of utilizing neoprene as an adequate substitute for rubber without consideration of the possible advantages obtained by this substitution. The ability of neoprene latices to be coagulated with salts and acids, to be deposited on a form as a uniform film, and to be dried and cured under approximately the same conditions as rubber latex fostered this substitution complex.

With increased use throughout the war years, however, the unusual properties of neoprene latex films, their resistance to sunlight, ozone, heat, aging, solvents and flame, showed conclusively that neoprene latex could not be considered as a mere substitute for rubber latex, but rather as a new and unusual basic latex upon which to build an ever-expanding field of uses.

The neoprene latices are chloroprene polymers and, like the dry types—GR-M, Type CG, and Type NC—are polymerized in emulsion. In order to stabilize the emulsion and produce a salable latex, special soaps and buffers are added. The elastomer in neoprene latex can be stabilized with a higher degree of polymerization than is present in the dry polymers, since no further work is done on it, such as the milling, calendering or extrusion which are necessary in the processing of dry polymers. Such a latex yields uncompounded, uncured films having a tensile strength of 2500 psi and an elongation of 1000%.

In general, the neoprene latices are alkaline, having a pH in the range of 10.5 to 12.5. The general purpose latices (Type 571 and Type 842) are prepared at 50% total solids content. The concentrates (Type 601 and Type 60) have a 60% total solids content. Electron microscope photographs using the shadow technique reveal that the neoprene particles are small spheres (Figures 1 and 2). Measurements of these particles show that their average size is 120 mμ with a range from 50 to 190 mμ (Figure 3). This small and uniform size is undoubtedly the cause of some of the unusual properties of neoprene latex.

Articles can be prepared from neoprene latex by any of the normal manufacturing procedures recommended for rubber latex. Straight and coagulating dip processes, extrusion and gelation methods, foaming, spreading and spraying processes are all applicable for use with the neoprene latices.

In order to describe the many products made from the neoprene latices with some continuity, the discussion is divided into sections based upon the above generally accepted methods of producing most latex articles of commerce.

Note: This article is based on a paper delivered by the author before the Boston Rubber Group at Boston, Mass., on March 14, 1947.

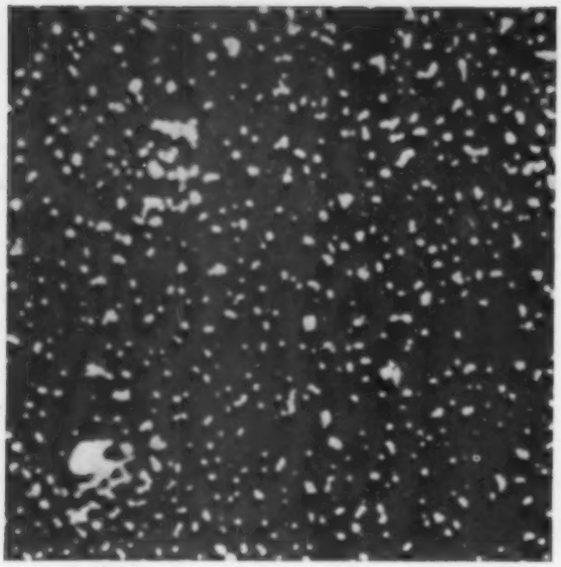


FIG. 1—Electron microscope photograph of Neoprene Latex Type 571 at 5,000 magnification.

Dipped Goods

The first commercial application of neoprene latex was in the manufacture of household gloves where advantage was taken of the naturally superior aging and solvent resistance of neoprene films. Figure 4 shows the resistance of neoprene films to swelling in a number of classes of chemical compounds. The excellent solvent resistance of neoprene is easily seen. In the case of benzene, although the neoprene films swell considerably, the swollen films are still strong and rubbery.

During the war millions of pairs of decontamination gloves were made from neoprene latex. These gloves were extremely well suited for handling toxic gases, since they withstand exposure to mustard gas for periods four to six times as long as do rubber gloves of similar thickness without allowing the gas to permeate through to the skin.

Postwar uses for neoprene gloves are almost unlimited. Their superior solvent resistance is resulting in an ever-widening market in industrial applications. For example, the synthetic fiber industries require a glove resistant to carbon disulfide in one of their operations. Neoprene latex gloves compounded with resins or fillers of plate-like structure will meet these needs. In oil and gas refineries operators are requesting neoprene gloves because of their resistance to snagging when covered with oil and grease.

While these advantages are of extreme importance in industrial applications, they are also important to the housewife who has become quality and performance conscious. Today there is a great demand for household gloves which are resistant to oil polishes, soapy water and cleaning fluids.

Many of the new neoprene gloves are being made with added features such as non-slip palms and finger surfaces, non-roll cuffs or the inverted cuff to prevent liquids from running down the forearm. Thus, an established application for neoprene latex, dressed up in new colors and new designs, becomes an expanding postwar field.

Another part of the coagulating dipped field that is offering a wide application for neoprene latex is metal coatings. Because of its ease of application and excellent service record in resisting the deteriorating effects of sunlight, ozone, and solvents, dish and plating racks, photographic trays and tanks, potato and egg baskets, lamp guards and many other miscellaneous pieces of equipment are being covered with neoprene latex films. The superior abrasion resistance of neoprene films is an additional reason for using neoprene on many of these articles.

Most medical sundry articles have been prepared in the past by molding the dry polymer. The ease of preparing such articles from latex by the coagulating dip method has resulted in an expanding use of latex in this field. Neoprene latex has found an important use in the manufacture of catheters, specialty medical tubing and douche and solution dispensing reservoir bags due to the superior resistance of its films to oily type lubricants and emulsions.

In the medical glove field neoprene latex surgeons' gloves have found a small but expanding market. It is generally recognized that the ability to withstand repeated sterilization is an important factor in long lived surgeons' gloves. Tests show that neoprene surgeons' gloves withstand 125 sterilizations without significant loss in tensile strength, whereas rubber surgeon's gloves withstand only 25. Neoprene gloves are also used by many surgeons who have a specific allergy to rubber. In spite of these superiorities, the use of neoprene in this field is small. However, it is steadily increasing.

There are many other articles prepared by dipping in which the inherently good physical properties of neoprene latex films offer expanding applications. The examples discussed, however, should be sufficient to indicate the possibilities for neoprene in this field.

Extruded Latex Thread

In 1925 the Hopkinson method for the manufacture of thread by the extrusion of latex from a nozzle into

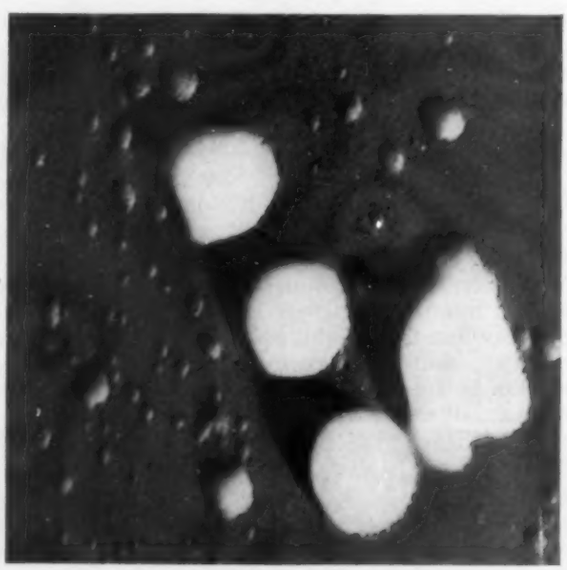


FIG. 2—Electron microscope photograph of Neoprene Latex Type 571 at 12,500 magnification.

a coagulating bath was developed. The commercial application of this process resulted in the production of a new type of webbing thread having a round cross section, and stimulated the growth of markets for elastic thread in the garment, stocking and underwear fields. For the past three years practically all of the latex thread used in webbings has been made of neoprene, since the use of natural rubber latex for this purpose has been prohibited.

Many difficult problems were solved by fabric manufacturers in replacing natural rubber thread with that made of neoprene latex. In the manufacture of elastic fabrics the thread is incorporated into the fabric in a stretched condition and woven or braided in such a manner as to retain a degree of stretch in the finished product. Finished fabrics having desirable characteristics were obtained by stretch control methods based on the use of rubber thread having stress-strain properties which had been established by years of experience.

Since neoprene thread had different stress-strain properties, it was necessary to revise manufacturing procedures in order to make fabrics having the proper characteristics. The problems involved in making these changes can scarcely be appreciated by those not engaged in the fabrication of elastic fabrics. However, the quality and quantity of elastic fabrics manufactured in the past three years testify to the fact that these adjustments have been made in a satisfactory manner.

Fabric manufacturers who have revised their specifications are now in a position to evaluate the uniformity of neoprene thread. From the above it is obvious that lack of uniform stress-strain properties in the rubber thread will result in elastic fabrics having variable properties. Thread uniformity in turn depends upon a uniform state of cure. Neoprene latex thread, in contrast to natural rubber thread, has an extremely flat curing curve, and normal variations in curing time and temperature will have less effect on its elastic properties. Therefore, the use of neoprene latex should result in a thread having more uniform stress-strain properties. It is believed that this superiority for neoprene will be commercially demonstrated when production comparisons between rubber and neoprene thread are again possible.

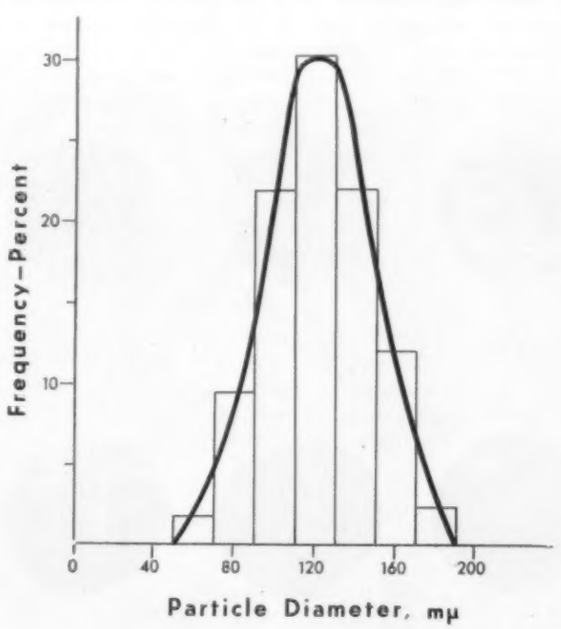


FIG. 3—Frequency distribution of particle diameters of Neoprene Latex 571. (Courtesy, Columbian Carbon Co.).

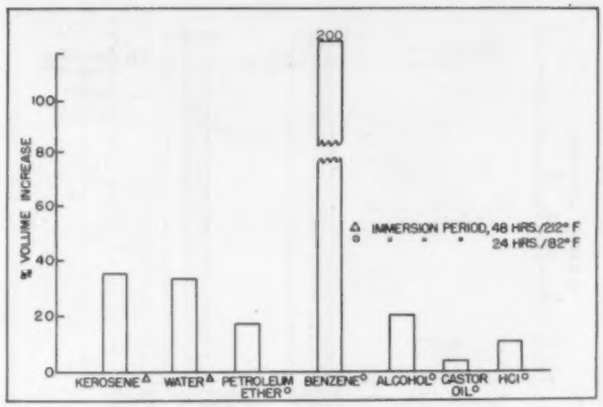


FIG. 4—Percent increase in volume of neoprene latex films after immersion in specified solvents.

Garments made with neoprene latex thread have excellent aging properties. Tests run at the Laboratory show that neoprene latex films will withstand 90 days' aging in the oxygen bomb.

Neoprene is also resistant to perspiration and to body oils and acids. These properties suggest its use in athletes' clothing and auxiliary equipment. Combined with its resistance to sunlight and salt water these properties make neoprene a "natural" for use in swim wear.

Balloons

During the war there were two major uses for balloons; first, for meteorological work and, second, as supports for antenna used with airplane rescue craft radios. These balloons are unusually large in size and normal dipping processes were not commonly used in their manufacture. They are made by gelling a thick deposit of latex in or on a mold. The gelled sphere, while still wet, is partially expanded with compressed air, dried, then deflated and cured. The partial expansion of the wet gel racks the film, causing all of the molecular chains to be aligned in one direction. This allows the chains to slip past each other during expansion and accounts for the great bursting diameters of the balloons.

In practice the sea rescue balloons were used when planes were forced down at sea to increase the range of the portable sending radio set. The balloon was filled with hydrogen from a lithium generator activated by immersion in salt water and sent aloft with an antenna attached. This increased the sending range of the radio ten to twenty fold. At the beginning of the war rubber balloons were used. However, they failed under tropical service conditions in twelve to twenty-four hours. Balloons made from neoprene latex possessed superior sunlight and ozone resistance and lasted three to four weeks. Not only did the neoprene balloons withstand the long exposure to sunlight and ozone, but the gas permeation through neoprene films was

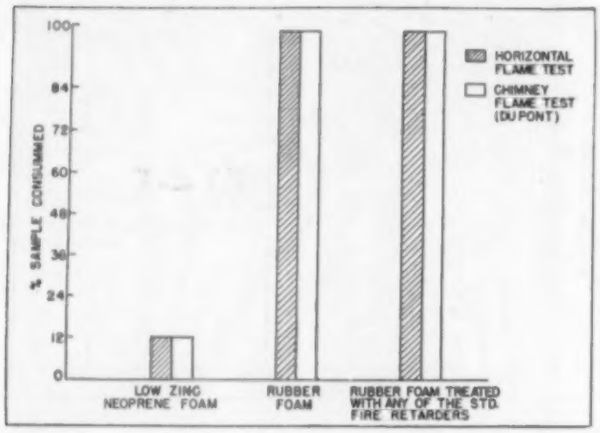


FIG. 5—A comparison of the flame resistance of latex foam.

only about one-quarter that of rubber films of the same thickness.

In the meteorological field neoprene balloons are being used extensively. The present trend in weather predicting is for long range forecasting. Such forecasting requires information regarding temperatures, pressures and wind velocities at altitudes as great as 100,000 feet. The data are obtained by sending aloft balloons to which are attached radiosondes that record these constants and transmit them to the ground where they are received by radio.

These carrier balloons that will attain 100,000 foot altitudes actually have a diameter of about 32 feet at the bursting height and a wall thickness calculated at 3/10,000 of an inch. The balloons under such flight conditions are exposed to penetrating sun radiations and large concentrations of ozone. The superior resistance of neoprene films to such exposure conditions indicates the importance of neoprene in meteorological balloons.

In toy balloons and football and basketball bladders the property of gas retention is also useful, since once expanded neoprene balloons and bladders do not become flabby due to air permeation through the film, even over extended periods of time.

Latex Foam

Manufacturing methods for products made of latex foam, like those for meteorological and sea rescue balloons, are based upon the controlled gelation of latex compounds. This new and expanding use of latex represents one of the most interesting and important developments in all latex technology. Estimates of an annual consumption as high as two hundred and eighty million pounds in the early 1950's have been made, which indicate that this use of latex may rival even the tire market in the amount of elastomer consumed.

Latex foam finds its largest applications in the upholstery, mattress, and resilient mounting fields. Its advantages are many—it conforms to the shape of the body, thus giving maximum support and diminishing fatigue; it does not become excessively warm, since it breathes due to its interconnecting cells; it will not sag even after prolonged use, and it absorbs shock rapidly. This last property is extremely important in transportation equipment, such as cars, trucks and trains, because the seat can then act as an auxiliary shock absorbing unit.

The manufacture of latex foam products is relatively simple. In the first stages the latex and compounding ingredients are placed in the beater and frothed to the desired density. The gelling agent is incorporated into the froth which is still in the fluid state. It can then be poured with ease into complicated molds where it is allowed to gel and then cured and dried. Modern manufacturing processes require that latex foam be cured very rapidly. Present high frequency curing methods call for a 7.5 to 10 minute cycle for fully molded, double-size bed mattresses.

Neoprene latex foam has been made commercially for the last five years. Not only does it match all of

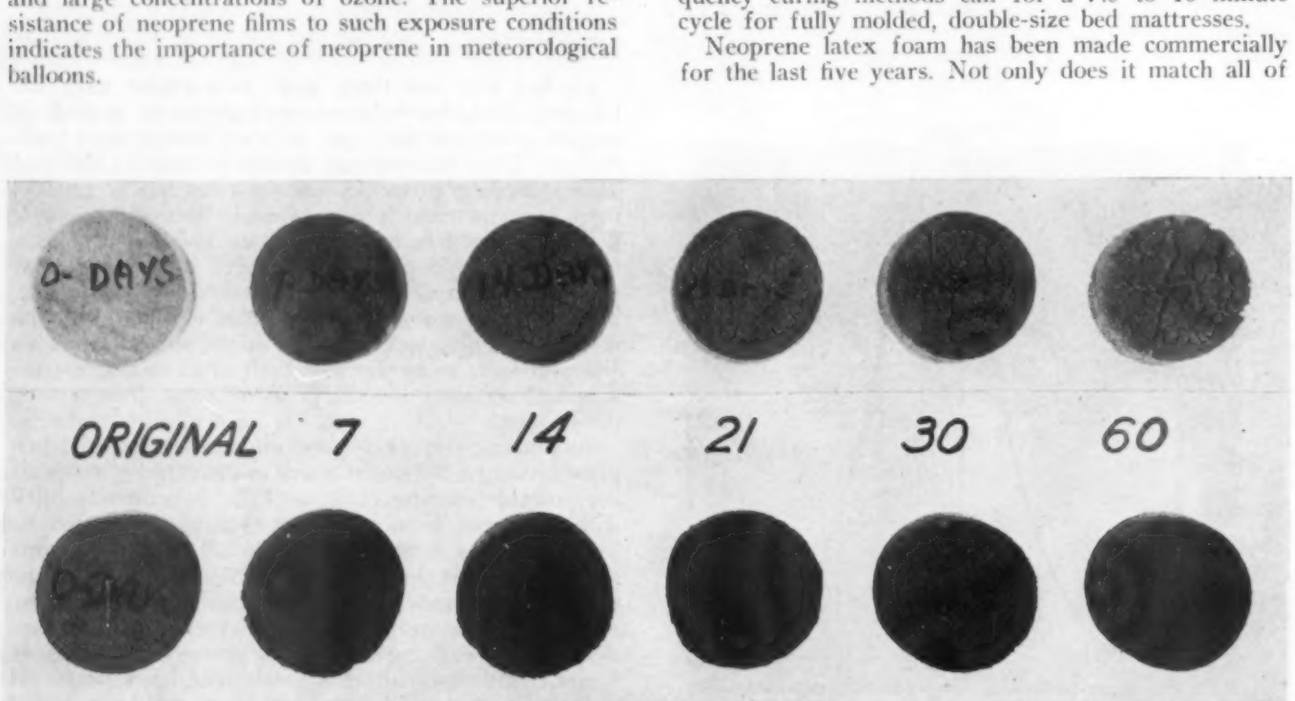


FIG. 6—Sunlight resistance of neoprene and rubber foam. Top row shows rubber foam specimens; bottom row, neoprene specimens. Figures indicate days aged in Florida sunlight.

the properties of rubber foam, but it offers other outstanding properties, including flame resistance, sunlight and ozone resistance, superior flex resistance, excellent aging properties and improved riding qualities.

Flame resistance may be defined as the resistance to the propagation of flame. In some cases the article may char as long as it is in contact with a flame, but a flame resistant product must not support combustion when the flame is removed. In comparing the flame resistance of neoprene and rubber latex foam, two types of tests have been used at the Du Pont Rubber Laboratory, the Du Pont Vertical Tube Method and the Horizontal Burning Test. Figure 5 compares the flame resistance of neoprene and rubber foam using these methods, brief descriptions of which follow:

Du Pont Vertical Tube Method: Samples cut from cured slabs are ½ inch square and 6 inches long. They are suspended in the center of a vertical Pyrex tube 1½ inches in diameter and 6 inches long so that the upper end of the sample is flush with the upper end of the Pyrex tube. A Bunsen burner with a soft blue flame 2 inches high is placed under the center of the tube so that the tip of the blue flame just contacts the lower end of the sample. The flame is applied for 30 seconds and then withdrawn. The charred material is broken off until only snappy, resilient foam remains. The length of snappy foam left is measured. The temperature at the top of the tube during the test is is sufficient to ignite quickly a pine splint held over the tube.

Horizontal Flame Test: Samples are molded in the shape of bars 1 inch x 1 inch x 12 inches long. They are suspended by hooks horizontally from a bar. A Bunsen burner with a soft blue flame 1 inch high is placed at one end so that the tip of the blue flame just contacts the lower side of the sample. The flame is applied for 5 minutes and then withdrawn. The charred material is broken off until only snappy, resilient foam remains which is then measured.

In Figure 6 the sunlight resistance of neoprene foam is shown. The samples of neoprene and rubber foam were aged in Florida sunlight for various periods of time extending to 60 days. Even after this aging period the neoprene foam was soft and resilient and showed no sign of deterioration.

A cushion, whether constructed from springs, kapok or latex foam, must withstand prolonged flexing. Present underseat heating unit design in public conveyances makes it imperative to retain flex resistance at temperatures of 70°C. and higher. The flex resistances of neoprene and rubber foam at 28°, 70° and 100°C. are compared in Figure 7. Prolonged flexing at these temperatures has little effect on neoprene latex foam, except to increase its modulus slightly. Rubber foam under the same conditions becomes soft and therefore will carry less load and "bottom" more rapidly.

The unexcelled aging properties of neoprene foam are quantitatively shown in Figure 8. This graph shows that even after 50 days in the oxygen bomb at 70°C. and 300 psi oxygen pressure there was no significant change in the compression-deflection properties of the neoprene foam. The age resistance of foam is judged by the degree of softening or loss in compression-deflection properties after exposure to bomb aging.

In riding qualities neoprene latex foam offers inherently a more shock resisting material than does rubber foam. This is due to its faster damping rate. Figure 9 compares the free vibration curves of neoprene and rubber foam. The sooner the oscillation damps out the better is the shock absorbing property of the foam.

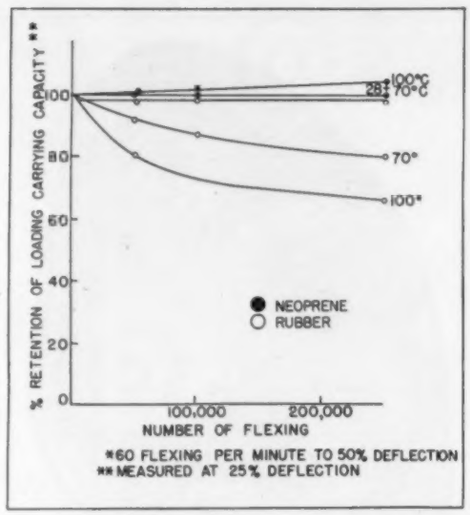


FIG. 7—Effect of flexing at 28°, 70°, and 100° C. on the load carrying capacity of latex foam.*

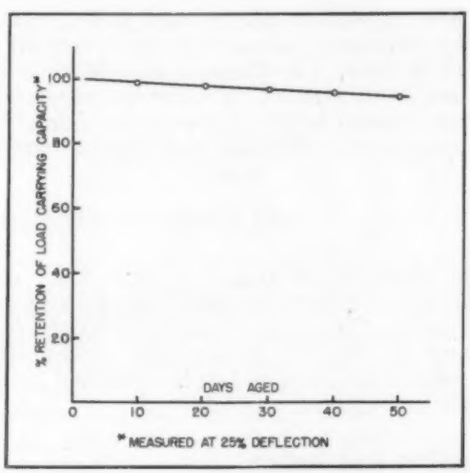


FIG. 8—Effect of oxygen bomb aging on neoprene latex foam.

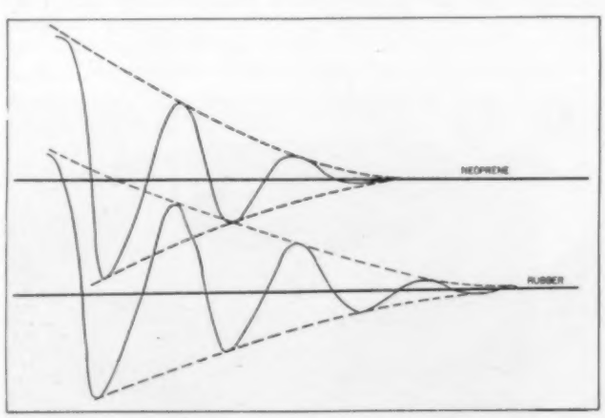


FIG. 9—Free vibration curves of latex foam (measured under a load sufficient to deflect the sample 25%).

FIG. 10—This tractor seat is prepared by pouring neoprene latex foam into the metal base. The foam is allowed to gel and is then cured. To give an impervious coating to the seat, neoprene latex is sprayed over the foam and exposed metal parts.

These properties of neoprene latex foam combine to make an upholstery material having extraordinary characteristics. The value of its flame resistance in the upholstery of seats in public conveyances, theaters, public service buildings and in hospital and hotel mattresses is self-evident.

Some Specialty Foam Products

There are certain other applications for neoprene that combine foam and films, and foam and fabric. Some specialty products utilizing neoprene foam are shown in Figures 10 to 13. Some of the products illustrated are not being made commercially but they serve to show the possible development of new and useful products made from neoprene latex foam.

FIG. 11—This drum gasket is prepared in the same way as the tractor seat shown in Fig. 10.

FIG. 12—Foam spread fabric.

Hair, Fiber and Staple Fillers as Upholstery

Rivaling foam in its bid for the upholstery market are latex-treated curled hair, latex-sprayed fibers and foam-treated wool and cotton staples. These fiber and hair latex-treated materials offer good resilience, high load carrying capacity, fast damping, and low permanent set properties combined with a relatively low cost.

In practice, the hair or fibers are passed through a garnett for randomizing the fiber length distribution. They are then fluffed in thin sheets onto a building table and sprayed with latex. The operation is repeated and the sheets superimposed on one another until a pad of the desired height has been built. The slab is then dried and cured.

It is obvious that such products are extremely vulnerable to air oxidation, since the latex is deposited as thin films between adjacent fibers. Deterioration of the film would cause the cushion to take on a permanent set or sag. The possibility of rapid deterioration under these conditions is so great that for many applications neoprene is the only elastomer that can be used successfully.

Adhesives

In the field of latex adhesives the general purpose neoprene latices lacked some of the desired qualities of an adhesive, such as high bond strength and fast emulsion breaking characteristics. It was therefore necessary to build these properties into a new neoprene latex. A research study of this problem culminated in Neoprene Latex Type 572.

It is not only necessary that an adhesive have a finished high bond strength, but it must attain this strength rapidly after the bond has been made. Figure 14 shows the exceptionally high bond strength of neoprene latex after various aging periods when used as an adhesive for bonding leather. The rapidity with which neoprene latex adhesives reach their maximum shoe manufacturers.

Paper and Fiber Impregnation

The use of the neoprene latices as paper and fiber saturants is relatively new. As in the adhesive field, it soon became apparent that the general purpose neoprene latices were lacking in the necessary qualities of a good paper saturant. The desirable properties for this use were not the normal ones associated with latex films, such as high tensile strength, resilience and low permanent set, but rather special properties, such as rapid saturating rate, softness and good tear resistance.

Neoprene Latex Type 700, a recent development of our research staff, fulfills these requirements. The new neoprene latex offers the usual excellent natural aging properties of neoprene and resistance to heat combined with good saturating power, tear resistance and softness. These properties make it of interest as a saturant for gasketing materials, imitation leather and inner soling.

Laboratory tests have shown that paper impregnated with Neoprene Latex Type 700 is soft and pliable after aging for 20 days at 100°F. This degree of heat resistance appears to be substantially greater than any previously obtainable in this field, and indicates that Neoprene Latex Type 700 will also be an important saturant for asbestos and cork gasketing materials widely used in engine construction.

Rug Backing

In the rug backing field the need for an anchoring or bonding agent has resulted in the investigation and use of a wide range of materials. These include starch, glue, rubber latex, and reclaimed rubber dispersions. Neoprene latex is a newcomer to this field; yet it is an application wherein its physical properties offer unlimited opportunity.

The rug backing field may be broadly divided into two classes, namely, flexible and non-flexible. In the latter starch and starch-resin mixtures have been widely used. While such mixtures are sufficiently good for original applications to the rug, under flexing or laundering the backing is weakened, since some of it is disintegrated by flexing or washed away. To overcome this, the trend has been toward the flexible type of backing in which an elastomer has been used as the binder. The superior natural aging properties of neoprene are important here, since failure of the backing due to either embrittlement or softening on aging destroys the serviceability of the rug.

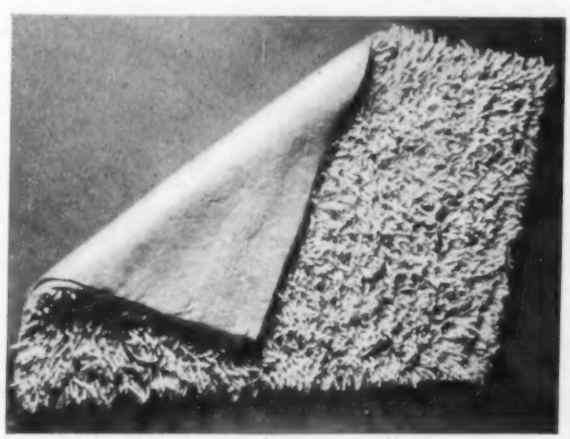


FIG. 13—Foam spread fabric used as rug anchor.

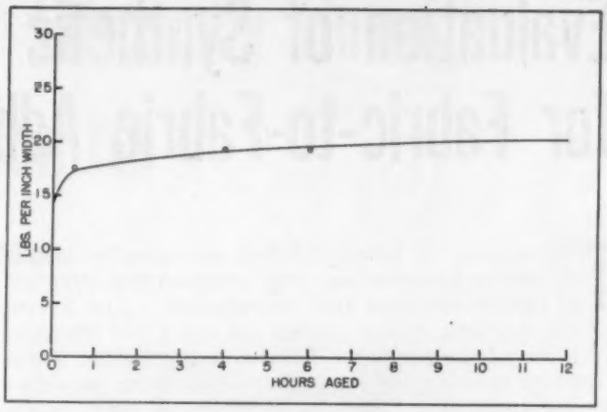


FIG. 14—Effect of aging on the bond strength of a neoprene latex adhesive.

Neoprene latex can be heavily compounded with resins and fillers to produce relatively low cost, high efficiency rug backing compounds. The recently introduced Neoprene Latex Type 700 also appears to have considerable merit in this field. By using varying proportions of Neoprene Latex Type 700 and one of the general purpose neoprene latices, backing compounds of varying degrees of flexibility can be made.

Newer Applications for Neoprene Latex

Most of the applications so far discussed have been produced on a commercial scale. There are many other applications of neoprene latex which are just emerging from the laboratory which have sufficient promise to warrant mention. Some of these are based on the fact that it can be compounded with materials other than those usually employed for rubber latex. For example, a colloidal silica can be added to neoprene latex to produce a compound that is unusually well suited for bonding glass fibers.

Other applications for neoprene develop as new latices are made and studied. For example, an experimental non-foaming type neoprene latex is finding use as a bonding agent for fiber mats processed in a continuous operation where the foaming of ordinary neoprene or rubber latex cannot be tolerated. In another case, a film resistant to swelling by water was desired. A neoprene latex was made with non-ionic type emulsifying agents and found to be the answer.

Again, a latex capable of impregnating wool was needed. The normal latices were not suitable for the job, since they have the same ionic charge as wool and are repelled by it. Therefore, instead of the latex impregnating the wool, it merely coated the surface. Preparation of a cationic type of neoprene latex solved the problem.

Most of these new latices just discussed are still experimental, but they make one realize that while the present commercial neoprene latices exhibit many unusual properties not found in other elastomers, the future holds even brighter hope for new and better neoprene latices. Each new latex means new applications, and new applications mean new or expanded business.

Evaluation of Synthetic Rubbers for Fabric-to-Fabric Adhesion

THE subject of fabric-to-fabric adhesion by means of rubber cements has long occupied the attention of rubber chemists and technologists. The advent of the synthetic rubbers called for more and intensive research of the problem. Results of a series of investigations utilizing the synthetic rubbers were presented in the form of a paper by G. L. Hammond, of the British Ministry of Supply, and R. C. W. Moakes, of the Research Association of British Rubber Manufacturers, before the London Section of the Institution of the Rubber Industry, on October 15, 1946. An abstract of this paper, entitled "Preliminary Evaluation of Synthetic Rubbers for Fabric-to-Fabric Adhesion," which will be published in full in an early issue of the *I. R. I. Transactions*, follows herewith:

In reviewing the literature it was found that there was no very comprehensive study of fabric-to-fabric adhesion by means of rubber cements. The only work with a direct bearing on the subject is of Russian origin and is concerned with cements made from the Russian polybutadiene rubber. The conclusions of these workers were that adhesion, as determined by a stripping test, is mostly a function of the cohesive strength of the bonding layer, that the resistance to ply separation was sensitive to temperature and was a function of the weight of dried cement per unit area.

For the preliminary work described in this paper, the stripping test described in Ministry of Aircraft Production Specification KB62 was employed, using various simple solutions of natural rubber and GR-S. From this work it was concluded that, in order to get comparable results, close control was necessary of the amount of dried cement present on the test piece and of the temperature of stripping, as had been found by the Russian workers.

Accordingly, the following test procedure was worked out. A piece of proofed 2-ply ballonet diaphragm fabric about 10 in. wide and 24 in. long, lying on a rigid flat surface, was spread with the cement to be examined using a 12 in. steel straight edge as spreading knife. To the ends of this knife were attached devices for adjusting the thickness of coat applied. With synthetic rubber cements the spread sheet was then allowed to dry for 5 minutes in a place with free air circulation after which the piece was doubled in half, rolled 12 times with a 10 lb. cylindrical weight, festooned at room temperature for 24 hours and finally dried at 60° C. for 3 hours. The application of a single coat usually provided a dried film about 2 to 3 mils. thick. In evaluating a given cement, similar doubled samples were prepared by spreading 2, 3 and 4 coats of cement and allowing 5 minutes drying time between the application of successive coats.

Test specimens 1 in. wide and 8 in. long were then cut from the dried doubled sheets, one end separated for about 3 in. and each piece looped back on itself and stapled in a manner suitable for easy attachment to the grips of the stripping tester. On the centre 4 in. of each test piece pencil lines ½ in. apart were marked across. The average total thickness between each pair of lines was then determined using a ten-thousandth in. dial gauge and from a knowledge of the original average thickness of the piece of fabric employed the thickness of cement film was deduced.

The average stripping load between each pair of pencil lines on each specimen was then determined using a simple mechanical tester. The latter consisted of a vertical dynamometer employing a spring balance 0 to 24 lb. for recording load, and a driven member working at a speed of 2 in. per minute, all enclosed in a thermostatically controlled wooden cabinet with a glass front.

Using this technique and employing a non-vulcanizing GR-S cement consisting of 90 GR-S-10 smoked sheet dissolved in benzene to give a 20% solution, an examination was made of the effects of (1) temperature of test between 20° and 35° C.; (2) width of test piece; and (3) speed of stripping. It was found that the effect of temperature on the stripping load at a particular film thickness is very marked but that such effect is independent of film thickness. The stripping load does not seem to be proportional to the width of test piece due presumably to a weakening effect of the edges. With regard to speed of stripping, the load at a particular film thickness increases, as might be expected, with increased speed of stripping due to the viscosity of the rubber of the cement film.

The effects of change in mastication period of the GR-S, the addition of peptizing agents during mastication, and the addition of certain resins in a GR-S 90 natural rubber 10 mixture on the bond strength of cements prepared by dissolving in benzene have also been investigated. Bond strength falls rapidly with the first 10 to 15 min. mastication time of the GR-S but subsequently very much more slowly. This suggests that a very short period of mastication gives the best bond but such solutions are difficult to prepare and moreover gel rapidly on storage so that a compromise must be used in practice.

Of the resins examined only the German Koresine and, to a lesser extent, the American coumarone resin Cumar MH 2½ showed any improvement in bond strength over cements without resin. The effects of changing the solvent and the addition of the calcium silicate filler Silene to the GR-S were also examined. Commercial solvents such as solvent naphtha (90°-160° C.) and Lotemsol containing small amounts of higher boiling fractions seemed to give better bond strength when used with GR-S than the pure solvent benzene and carbon tetrachloride.

Cements based on a range of acrylonitrile-butadiene copolymers and chloroprene polymers have been evaluated by this technique, and with both of these, bond strengths considerably in excess of any obtained with GR-S or natural rubber, have been obtained. Generally speaking, in the acrylonitrile series the higher the content of acrylonitrile, the higher the bond strength.

Increasing Production Efficiency through Visual Control

By KELCY KERN

DURING the war it was recognized that book and file records of purchases, inventories, assemblies, and many other factors in a production or operational job were fraught with many shortcomings. For one thing, they present past history, for another, they take time to coordinate and bring all the factors into line with each other. A day-to-day, and often an hour-to-hour, picture was needed, and this was especially true in the rubber industry.

Visual control provides the answer in most cases. The development of such controls in industry has been rapid, and good examples in the uses to which the visual control system (board) is utilized within the rubber industry can be found at the plants of the General Tire & Rubber Co., Wabash, Indiana, Goshen Rubber & Manufacturing Co., Goshen, Indiana, Oliver Tire & Rubber Co., Oakland, Calif., and others.

Control of all factors, including raw materials, inventories, personnel, shipping, production rate on separate numbers, sizes and/or items, and sales, can be effectively accomplished through visual control, and spotted at a glance by all concerned in the rubber plant. In this manner potential bottlenecks are discovered before they occur and delivery promises made and kept, since there is a constant acquaintance with all factors involved in the production scheme.

Visual methods are extremely flexible and have been found to provide for any production, management or operational factor or element desired. Also, it has been found in plants using the system that the time required to maintain the visual controls is as little as an hour a day by an ordinary clerical worker.

Visual control system utilized by several rubber manufacturers. Featuring flexibility, the system is extremely simple and easily operated.

Reliance on paper records alone, as indicated in this illustration, tends to make for confusion, as many executives can testify.

The visual control system referred to here is extremely simple, and can be operated by an intelligent routine office worker. The flexibility of the method will be easily realized from the following description:

A visible index is located at the left side of the board (see illustration). It is used to hold the permanent card records of the items or elements under control. There are 100 card pockets on each panel. A legend is located at the top of the board, and is used to show the meaning of the pegs and cords.

A peg hole section is placed on the main body of the board—for the purpose of visibility analyzing information on the cards by means of the pegs and cords. A heading strip is attached across the top of the peg hole section — to reveal quantity and/or time represented by peg holes from left to right. There is one tape peg for each item in the visible record panel, and each is numbered to correspond with the card pocket (at its left). Each peg is attached to a cord which pulls outward from the board so that it may be extended from left to right on the board as needed.

The signal pegs are to be located, according to pro-

cedure, in the various peg holes, their meaning being noted on the legend at the top of the board. The "today line" is attached vertically to the board and is moved periodically from left to right in accordance with the time element in the procedure.

Thus, in making it possible to exert control in this kind of an operation, a visual method such as this offers certain very definite advantages. It provides at a glance a knowledge of all pertinent facts and figures, and eliminates from the executives' attention situations which are in a normal condition, spotlighting the bad points and thereby reducing, immeasurably, the amount of time necessary to make an analyzed report. It flashes the facts to all interested parties at one time, is flexible and can be adapted quickly to any problem. It eliminates or greatly reduces (according to the user) the amount of time necessary for the accumulation of usable facts from a routine, paper record.

It is a well known maxim that "in any kind of business operation, the greatest obstacles to efficiency are bottlenecks that appear from nowhere, and always develop at the wrong time." However, it is also true that bottlenecks do not just casually happen, they are the slow, constant, growth of weak production or operating control which reflects the need for improvements. Students of postwar business controls generally agree that, in view of these facts, the remedy at hand is to have a stronger link of production or operation functions with the central control that gives an up-to-the minute picture of your business—graphic presentation of past, present and future operations, singly, combined, and in proper sequence one to the other.

As users of such systems have pointed out, when production (or, as the case may be, operation) is under accurate central control, there's far less waste of time and money—because men, resources and/or necessaries are used to their fullest capacity. The saving of valuable man-hours and the conservation of vital executive time are among the results of efficient production.

Before the war, these needfuls and their objectives were appreciated and even sought in industry, business and transportation through various methods. In the postwar world industry is becoming constantly more visual-minded with the result that methods of operation in all kinds of enterprises today are converging to the point of the graphic as described.

Uni-Bond Process of Relining Brakes for Motor Vehicles

THE Uni-Bond Process, a new and more efficient means of relining brakes for motor vehicles, was recently announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Equipment to provide Uni-Bond brake lining service has already been installed and is now in use in the service departments of several hundred of the company's dealers throughout the United States.

Developed by Goodyear, the new technique embodies an improved principle in lining of brakes. The Uni-Bond process binds the lining to the brake shoe by use of Uni-Bond cement, replacing the old method of riveting. This makes possible the exposing of a larger contact area of lining to the brake drum, resulting in better brake performance. By eliminating rivets, lining applied by the new method may be worn completely down to the shoe, rather than only to the rivet heads as was formerly the case, insuring much longer brake lining life.

An additional advantage is the fact that this process prevents brake drum scoring, thereby saving expense of resurfacing drums. The reason for this is that riveted lining necessitates counter-sinking of rivet heads, so that the small indentations around the heads gradually fill with small particles and abrasive material ultimately responsible for scoring of the drums.

Tests conducted by Goodyear brake lining technicians indicate that bonding efficiency of Uni-Bond is approximately six to nine times greater than that of rivets. One gallon of Uni-Bond is sufficient for lining 1200 shoes, while costing much less than rivets for an equal number of installations.

The Uni-Bond process begins with burnishing of the brake shoes, after which shoes and linings are painted with Uni-Bond cement. Allowed to dry for 20 minutes at room temperature, lining and shoe are then forced together by pressure applied with a specially designed ring and spreader. Final step consists of curing the cement at a specified temperature by placing linings and shoes in a precision brake lining oven.

Relining of brakes by this method approximately doubles the brake lining life and is said to insure better performance.

One of the steps in the Uni-Bond Process employs an especially-designed ring and spreader in which shoes and linings are forced together by pressure applied with a torque wrench as shown, or by an alternate method which uses a preloaded, 1,000 pound coil spring instead of a torque wrench to produce necessary pressure on the ring.

Division of Rubber Chemistry, A.C.S., Meets in Cleveland on May 26, 27, 28

AS previously reported, the Spring Meeting of the Division of Rubber Chemistry, A.C.S., will be held in Cleveland, Ohio, on Monday, Tuesday and Wednesday, May 26, 27 and 28. All other divisions of the parent society held their spring meetings last month at Atlantic City, N. J., in conjunction with the 111th Meeting of the A.C.S. Headquarters for the meeting of the Rubber Division will be the Hotel Cleveland and all sessions will be held at that hotel. The meeting will feature the presentation of 34 technical papers, a business session, and the regular banquet. The banquet will be held on Tuesday evening, May 27, at the Hotel Carter. A cocktail party, sponsored by a number of suppliers, will precede the banquet. The first technical session will get under way on Monday afternoon, May 26. Technical sessions will also be held on the morning and afternoon of Tuesday, May 27, and the final session will be held on the morning of Wednesday, May 28. The business meeting will be held at the conclusion of the technical session on Monday afternoon. Abstracts of the 34 papers scheduled for presentation, together with their authors and company connections, follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Hotel Cleveland—Cleveland, Ohio
May 26, 27 and 28, 1947

Monday Afternoon—May 26

1:45 P.M.—Introduction by W. W. Vogt (Goodyear), Chairman, Rubber Division, A.C.S.
2:00 P.M.—General Papers.
4:25 P.M.—Business Meeting.

Tuesday Morning—May 27

9:00 A.M.—General Papers.

Tuesday Afternoon—May 27

2:00 P.M.—General Papers.

Tuesday Evening—May 27

7:00 P.M.—Division Banquet, Hotel Carter

Wednesday Morning—May 28

9:00 A.M.—General Papers.

ABSTRACTS OF PAPERS

Monday Afternoon—May 26

2:00 P. M.—Effect of Low Molecular Weight Polyisobutenes on Natural Rubber, GR-S, and Blends Thereof. ***Henry P. Pryor (Advance Solvents & Chemical Corp., New York 16, N. Y.).***

The low molecular weight polyisobutenes (L.M.P.B.), of which Vistac #1, Vistac #2, and Vistac #4 are typical examples, are extremely viscous liquid hydrocarbon polymers with estimated molecular weights of 1100, 1500, and 3000, respectively. By virtue of their nature and preliminary indications, the investigations were made by treating the L.M.P.B. as plasticizing agents.

The fullest advantage of any plasticizer is realized only if added to the rubber at the earliest possible stage in the mixing operation. Adding the plasticizer first followed by fillers and other ingredients was chosen as standard in these tests.

Results indicate the L.M.P.B. exercise plasticizing action, and shorten milling time by rapid incorporation and dispersion of fillers and other ingredients. Vistac #1, Vistac #2, and Vistac #4 being chemically inert have no effect on the curing rate and produce firm stocks with good processing qualities and aging characteristics.

A study of L.M.P.B. in typical GR-S stocks indicates a maximum tensile strength, modulus, and recovery up to 15 parts on 100 parts GR-S. Above 15 parts, the tensiles and modulus drop sharply producing very tacky vulcanizates attributable to the exudation of the L.M.P.B. Additions above 35 parts isolate curing ingredients from the rubber, thus producing a soft uncured vulcanizate.

On the other hand, the L.M.P.B. can be added in liberal dosages in natural rubber without exudation. Results of natural rubber vulcanizates plasticized with L.M.P.B. indicate excellent stress-strain properties, resistance to flexing, low permanent set and increased resiliency. Increases in the amount of L.M.P.B. are accompanied by a linear reduction in physical properties as contrasted to the sharp decline in GR-S.

Vistac #1, Vistac #2 and Vistac #4 are odorless, nontoxic, and do not discolor white or light colored stocks.

Data are given to illustrate the effect of L.M.P.B. on the plasticity of uncured stocks of GR-S, natural rubber, and blends, as well as the effects on the cured physical properties of typical compounds, in comparison with the following types of plasticizers: Coal Tar distillates, Asphaltic Flux products, and Unsaturated Hydrocarbons. Method of handling L.M.P.B. as well as illustrations of compounding incorporating times will be presented.

2:15 P. M.—Pliolite S6 in Rubber Compounding. ***R. J. McCutcheon and Harold S. Sell (Goodyear Tire & Rubber Co., Akron, Ohio).***

Pliolite S6 is a hydrocarbon copolymer resin, developed by the Goodyear Tire & Rubber Company, which has been used as an effective reinforcing agent for rubbers without the presence of black. Not only is the addition of Pliolite S6 effective in improving the physical properties of the polymer but it is a definite aid in improving the processing characteristics and aging properties of the stock.

The reinforcing action of Pliolite S6 is most effective in GR-S and Buna N polymers. Incorporation of up to 50 parts of resin to 100 parts of polymer hydrocarbon increases tensile

strength, increases elongation, increases modulus, improves tear resistance, improves flex resistance, and increases hardness without materially increasing the gravity of the stock. Pliolite S6 makes possible the production of quality light colored stocks of low specific gravity from these polymers.

The incorporation of Pliolite S6 into natural rubber and neoprene increases the modulus and hardness of the stocks but does not increase the already high tensile strength of the stock. One important advantage for the incorporation of Pliolite S6 into natural rubber stocks lies in the pronounced improvement in aging produced by as little as 10 parts of resin. Results to date have indicated no advantage to the use of Pliolite S6 in Butyl rubber.

Pliolite S6 also exhibits its reinforcing action in conjunction with black and can be used to secure additional reinforcement without obtaining the high specific gravity characteristic of high loaded black stocks.

2:30 P. M.—Processing Behavior of High Polymers—Effect of Plasticizer Type. ***A. M. Gessler and A. F. Sayko (Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).***

The purpose of this paper is to apply a new concept of plasticization to the processing improvement of synthetic high polymers. On the basis of vulcanizate swell, plasticizers are classified, for a given elastomer, as "solvent" or "non-solvent." Microphotographs add visual support to such a classification.

The processing behavior of polymer-plasticizer systems prepared from Butyl, Perbunan, Buna-S, and neoprene is considered. Experimental results are made to correlate with actual processing operations.

The elastic-plastic characteristics of the polymer are not altered favorably by inclusion of the "solvent" plasticizer. Hence, no processing improvements result. With the "non-solvent" plasticizer, drastic reductions in the apparent elasticity of the polymer systems are realized, so that exceptionally smooth processing stocks are obtained. Coupled with these data, the rate of extrusion of the "non-solvent" polymer-plasticizer system is shown to increase rapidly with the concentration of the plasticizer while that of the "solvent" polymer-plasticizer system remains substantially unchanged.

Since the "non-solvent" plasticizer is in the strict sense incompatible with the polymer, limitations in its use are developed based on the viscosity of the former to prevent its exuding from the stock and to allow for a close enough association with the polymer that the cohesive strength of the mass will not be destroyed.

Some theoretical considerations are advanced to explain the physical mechanism which is involved in the characteristic behavior of each of the two types of polymer-plasticizer systems.

2:50 P. M.—Softeners for GR-S Tires. I. An Evaluation of Nine Softeners in GR-S Tire Treads. ***V. V. Wheeler and R. Vance (General Tire & Rubber Co., Akron) and F. M. McMillan and B. O. Blackburn (Shell Development Co., Emeryville, Calif.).***

A selected group of softeners, containing examples of all of the types commonly used in tire compounding, was evaluated in GR-S tread stocks in road tests under a variety of conditions, supplemented by laboratory evaluations. Small but measurable differences in road wear were observed between the various types of softeners. Comparison of these differences with those found in the laboratory evaluation supports the view that laboratory tests cannot be used as a basis for precise predictions of road performance but are useful in screening out unsatisfactory materials.

3:05 P. M.—Softeners for GR-S Tires. II. Evaluation of Combinations of Carbon Black and Plasticizer as Extending Agents for GR-S Tire Treads. ***V. V. Wheeler (General Tire & Rubber Co., Akron), and F. M. McMillan and B. O. Blackburn (Shell Development Co., Emeryville, Calif.).***

In laboratory compounding studies it was found that an extender-type plasticizer could be used in combination with a carefully predetermined amount of carbon black to increase the total loading of GR-S tread stocks quite substantially while maintaining most of the physical properties of the vulcanizate practically constant and holding all of the important properties within satisfactory limits. Certain properties, particularly those of the aged vulcanizates, were best for the more highly extended compounds, and increasing advantages in processing characteristics as well as cost were noted.

An extensive series of road tests was carried out to evaluate the compounds developed in the laboratory in actual road service in both passenger and truck tires under a wide variety of climatic conditions, road surfaces and driving habits. In these tests the extended compounds performed quite satisfactorily, even the most highly loaded stock tested proving equal in road wear to the conventional GR-S tread stock used as a control.

3:20 P. M.—Isoprene-Styrene in the GR-S System. ***J. M. Willis, L. B. Wakefield, R. H. Poirier and E. M. Glymph (Firestone Tire & Rubber Co., Akron, Ohio).***

A series of isoprene-styrene copolymers varying in monomer ratio from 100/0 to 60/40 has been prepared in the GR-S recipe. Physical tests in a tread recipe show superiority for these polymers over GR-S in running temperature, blowout time and ball rebound at 212°F., with very little change being caused by monomer ratio. The tensile strength and cut growth resistance improved with increased styrene content while the room temperature rebound and cold resistance fell off.

A number of activated recipes have been applied to the 75/25 isoprene-styrene ratio at 50°C. with the following maximum conversion rates being obtained:

Activation	*Time. Hrs.*	*Conv. %*
Isoprene GR-S (control)	16.0	71
$K_3Fe(CN)_6$	16.0	84
Acrylonitrile (2 pts.)	15.3	82
Redox (soap flakes)	1.5	68
MDN*	4.0	77

* p-methoxyphenyl diazothio-β-naphthylether

The use of ferricyanide or acrylonitrile activation offer the most immediate possibilities for plant usage because of the small deviation from GR-S conditions. Only small variations in physical properties were noted for the polymers from the various activated systems. Little difference in physical properties was noted for polyisoprenes prepared in a redox system at temperatures ranging from 40°C. to 10°C.

Isoprene-styrene (75/25) copolymers with varying gel characteristics were prepared in a GR-S system. As the gel varied from low to high temporary to high permanent, the following effects on physical properties were noted: reduced running temperature, increased blowout time, decreased cut growth resistance, and little effect on tensile, elongation or rebound.

Tests on polymers prepared in the pilot plant have substantiated results obtained on polymers prepared in the laboratory.

3:40 P. M.—Furfural Phenylhydrazone as a Chemical Softener for GR-S. ***J. C. Ambelang, G. E. P. Smith, Jr., and G. W. Gottschalk (Firestone Tire & Rubber Co., Akron, Ohio).***

In the development of new processing aids for synthetic rubbers, it has been discovered that the phenylhydrazones of furfural and of certain aromatic aldehydes show high activity as chemical softeners for GR-S. The p-bromophenylhydrazone and the α-naphthylhydrazone of furfural are also active softeners, while the p-nitrophenylhydrazone is not. The phenylhydrazones of various additional aldehydes and ketones are either inert or show a stiffening action under comparable conditions.

Furfural phenylhydrazone may be effectively used in two general procedures: (a) by incorporating the hydrazone into the GR-S polymer on the mill and either storing for two weeks at room temperature or by oven-heating for a shorter period of time, and (b) by dispersing the furfural phenylhydrazone in GR-S latex so that after coagulation, drying of the polymer and softening take place simultaneously.

Air appears necessary for the softener to function. No softening was observed when the polymer-hydrazone mixture was dried in vacuo after coagulation of the latex.

Tread compounds of increased plasticity may be prepared from the furfural phenylhydrazone softened polymers.

It has been found that stiff, non-processible, high-Mooney polymers (ML 4/212 = 75 to 130) may be softened to equal regular GR-S of specification Mooney (ML 4/212 = 45 to 55) in processing characteristics, yet the vulcanizates retain many of the superior properties of the high-Mooney rubber, such as higher aged tensile, elongation, and crack growth resistance. Thus, plasticization and improved processibility of these polymers and stocks have been achieved without any additional operation other than that of mixing the furfural phenylhydrazone dispersion into the latex.

3:55 P. M.—Dome Type Calender Crowning. *Harold S. Sell (Goodyear Tire & Rubber Co., Akron, Ohio).*

Lower gum gauges, lower fabric gauges, and the utilization of synthetic polymers have necessitated more accurate calendering and calender crowning. Early trials with synthetic rubber stocks indicated that the conventional crowns used for natural rubber were not only too low, but these crowns rather than producing a gum sheet of even gauge, or of gradual increasing gauge at the center, produced a gum sheet with a rather pronounced hump at the center.

The purpose of the crown on the top roll being to compensate for the deflection of the rolls, it was questioned whether the method of crowning based upon the deflection of an evenly loaded free-end beam was the most desirable crown.

Considering the calender roll as semi-rigidly fixed in the bearings, one would expect the deflection of the rolls under load to approximate that of a fixed-end beam under uniform load. This was borne out by the shapes of the gum contours obtained on the under crowned calenders. On this basis there was developed what has become known as the "Dome-Type Crown." This crown is an average between the deflection of a fixed-end beam and the deflection of a free-end beam under uniform load. Calenders replaced with this type crown have given more uniform gauge gum sheets and are giving satisfactory production performance.

4:10 P. M.—The Effect of Airbag Thickness on the Cure of a 6.00 x 16 Tire. *H. A. Freeman (Goodyear Tire & Rubber Co., Akron, Ohio).*

Airbags of various thicknesses are used to cure a pneumatic tire. A cure study, by means of thermocouples, shows: (1) The effect of varying bag wall thickness on general tire cure; (2) The marked effect of a thick or thin airbag base on tire bead cure; (3) How to adjust the cure cycle with a given bag to obtain proper tire cure.

It is concluded that tire cure through a given point in the tire depends upon the total thickness of the tire and bag at that point, not upon the thickness of the tire alone. Increase in bag thickness subtracts cure from the tire at the point of increase. This cure retardation is greatest at the inner tube carcass and diminishes in intensity towards the outer tire next to the mold.

Tuesday Morning—May 27th

9:00 A. M.—The Effect of Carbon Blacks on the Swelling of Neoprene GR-M-10 Vulcanizates. *N. L. Catton and D. C. Thompson (E. I. du Pont de Nemours & Co., Wilmington, Delaware).*

Variations in the type of carbon black affect the volume increase of Neoprene GR-M-10 vulcanizates after immersion in standard test media. It has been found that in the case of carbon black loadings the swelling characteristics of the vulcanizates are dependent on other factors in addition to volume dilution. Degree of swelling at any given loading varies in inverse order to the surface area of the carbon black.

A study of volume increase data over a range of carbon black loading shows that the swelling values decrease most rapidly with increased loading at low loadings. At higher loadings, the degree of loading varying with the type of black, the decrease in swelling for a given black becomes proportional to the increase in loading. This indicates different reinforcement effects of the carbon blacks up to certain loading ratios—beyond which point additional carbon black serves only as an elastomer diluent.

Nineteen different brands of carbon black representing eleven official classifications were studied in a compound containing 30 volumes of carbon black to 100 volumes of neoprene elastomer. At this loading the limit of reinforcement had been reached for all types of carbon black. Five carbon blacks representative of channel, furnace and thermal types also were studied over a range of loading ratios.

Test conditions used were immersion for seven and fourteen days at 212°F. in ASTM petroleum base oil No. 3 and seven days at 82°F. in ASTM Reference Fuel No. 1.

9:15 A. M.—A Study of the Effect of Carbon Black on the Swelling Properties of Loaded GR-S Stocks. *Eli M. Dannenberg (Godfrey L. Cabot, Inc., Boston, Mass.).*

A relationship between the extensibility and the swelling of rubber has been known to exist for some time. Recent work has shown that since both these phenomena depend on the same structural variables a quantitative relationship can be derived.

In the more complicated situation of loaded rubber stocks containing reinforcing or non-reinforcing fillers there is superimposed on the structural factors influencing the properties of the rubber phase other factors associated with the properties of the filler. The relationship between "modulus" and swelling in these cases is shown to depend upon the properties of various types and grades of black.

If a plot is made of the logarithm of the "modulus" versus the logarithm of the swelling ratio of a stock loaded with a non-reinforcing black, the points corresponding to different cures and different loadings can all be represented by a single straight line. In the case of the reinforcing fillers dependency on the loading is observed, contrary to the above. A number of such plots for blacks of varying reinforcing ability is presented.

A study was made to determine the effect of various types of black on the swelling of the rubber constituent in loaded vulcanized and unvulcanized GR-S stocks. The swelling ratio of the rubber constituent was not influenced significantly by the different types of black. Reinforcing and non-reinforcing blacks affected the swelling of the GR-S to the same degree. These results would contradict any explanation of reinforcement which is based on the assumption that the filler must act as a cross-linking agent or physically adsorbs a portion of the rubber medium.

9:35 A. M.—Effect of Silicone Oils on the Physical Properties of Rubber Stocks. *Harry J. Collyer (Godfrey L. Cabot, Inc., Boston, Mass.).*

Rubber softeners have been classified according to their solubility characteristics. The more soluble softeners have greater compatibility with rubber and give soft, nervy stocks; the less soluble softeners function through a lubrication action, are only partially compatible and in time the excess tends to bleed or bloom. The discovery of the silicone oils naturally suggested investigation of its behavior as a rubber compounding ingredient, it being totally incompatible with rubber. The work presented deals for the most part with silicone oil in carbon black loaded rubber stocks.

The fundamental principle of the incorporation process depends on the black acting as a carrier for the oil. This can be accomplished either by premixing the oil with the black or by adding the oil to a black-rubber mix in the Banbury at a stage in the mixing cycle where the black is not at all wetted by or dispersed in the rubber.

Experimental work involved investigation of the problems of incorporation of silicone oil directly into the rubber-black mix during compounding, with observation of processing behavior and effects on the physical properties of the vulcanizate. Physical test data are presented showing performance of vul-

canizates containing various oil loadings. Several different blacks are investigated. Softeners with variations and substitutions are also studied.

The improvement in abrasion resistance of both channel and furnace blacks is the outstanding effect of the use of silicone oil. Improved extrudibility and appearance of the vulcanizates are also found. Abraded surfaces display much finer texture.

Preliminary work included silicone oil treatment of blacks and siliceous pigments; interesting hydrophobic products resulted and the treated pigments were easily dispersed in rubber.

9:50 A. M.—The Particle Configuration of Some Common Rubber Carbon Blacks. ***L. H. Willisford (Goodyear Tire & Rubber Co., Akron, Ohio).***

Electron micrographs which show particle configuration in addition to the usual profile outline have been obtained with carbon blacks milled in rubber. Typical blacks which have been thus examined are W6, Gastex, Philblack "A", Statex "A", Shawinigan, and P33.

Variously odd shaped particles are present in any black, but each type of black has some distinguishing configurations; i.e., each set of controlled conditions used in making carbon black determines the distinctive character of the size and configuration of the particles produced. Because they resemble aggregates, these odd shaped single particles are termed "pseudo-aggregates."

The pseudo-aggregates have constrictions and smoothly curved portions between the constrictions. The curved portion between the constrictions is termed the "sub-unit." The size, number, and arrangement of the sub-units determines the particle configuration. Exceptions to this constricted and curved sub-unit construction are the spheres occurring in varying quantities in some blacks and the hexagonal plates in Shawinigan black.

For the microscopic classification of the particles, the configurations have been divided into (1) non-linear; i.e., spheres, approximate spheres, and compact clusters, and (2) linear; i.e., non-branching, simple-branching, multiple-branching, rangy, stocky, and flat clusters. A table listing the various configurations as they occur in the blacks examined is given, and the size range of the sub-units of the different blacks is included.

An interesting particle growth mechanism has been hypothesized, and particles constructed according to this hypothesis correspond closely in appearance to the observed particles. The results given in this paper are based on electron micrographs having a resolution of 30 to 50Å.

Evidence that the light microscope dark-field counting method can give a reliable measure of the average diameter of carbon black particles has been obtained. Using a superfine black, enough particles can be counted to give an average particle diameter of 0.026 microns. Therefore, it is likely that practically all of the particles of Micronex were counted by the dark-field counting method which gave a diameter of 0.06 microns, especially since the electron miscroscope shows Micronex to have only a moderate variation in particle size.

Exception is taken to the presence of the "carbon-rod-linkage" in electron micrographs of P-33 and Thermax presented by earlier investigators because the apparent rod connection is an artifact. The formation of an artifact rod between any curved profiles slightly overlapped, in contact, or just separated, is a general phenomenon in the electron microscope image and is present regardless of degree of resolution obtainable to date.

10:15 A. M.—Today's Furnace Blacks. ***Isaac Drogin and Hester R. Bishop (United Carbon Co., Charleston, West Va.).***

Today furnace blacks hold a strong position in carbon black manufacture and demand attention by both producer and consumer. Accounting for half of last year's total carbon black production, furnace blacks offer to consuming industries a wide range of characteristics and varied performance in compounded rubber. Developments in methods of manufacture have resulted in better processing and stronger reinforcing blacks. Some furnace blacks already vie with channel black where maximum reinforcement and resistance to wear are prerequisites.

Today's furnace blacks are discussed by the authors from various angles covering (1) manufacturing processes, producers, patents, location of plants, yield, selling prices, growth in production since 1935, and the breakdown of 1946 production; (2) classification as to types and brands; (3) physical and chemical characteristics of fifteen furnace blacks, two channel blacks, acetylene black, and two German blacks; (4) a general comparison in natural rubber and GR-S of twenty-four furnace blacks, two channel blacks, acetylene black and two German blacks; (5) reduced acceleration in natural rubber and GR-S for six furnace blacks and one channel black; (6) blends of a highly reinforcing furnace black with two lesser reinforcing furnace blacks, two different channel blacks, and a highly acidic black, in natural rubber and GR-S; (7) increased black loadings in natural rubber and GR-S for six furnace blacks and one channel black; (8) the effect ot seven different accelerators on six furnace blacks and one channel black in natural rubber and GR-S; and (9) a comparison of six furnace blacks and one channel black in natural and six synthetic rubbers. Illustrations and rubber data are provided.

The importance of furnace black in solving postwar tire problems cannot be overlooked. The blacks with superior processing and high reinforcing qualities will induce better performance of GR-S treads. Properly accelerated, they should do equally as well in natural rubber treads. The role of furnace blacks in natural rubber will be selective and will be governed by the properties of the black.

10:35 A. M.—The Oxidation of Carbon Blacks. ***C. W. Snow, D. R. Wallace and A. L. Sweigart (United Carbon Co., Borger, Texas).***

The oxidation of carbon blacks at moderate temperatures is another means for developing information pertinent to the structure of the carbon black particle. The oxidation process used is such that carbon blacks can be completely oxidized slowly without the ordinary type of combustion. The products of oxidation, at any point short of complete oxidation, are water, carbon dioxide, carbon monoxide, and a residual sample enriched in oxygen. Four channel blacks and five furnace blacks were studied.

The ratio of hydrogen to carbon in the oxidation products varies throughout the entire process of oxidation, and this variation, insofar as furnace blacks are concerned, is consistent with their performance in rubbers.

No correlation in general can be found between the actual amount of oxygen which carbon blacks are capable of adsorbing and rubber properties. However, the evidence points to a close correlation between the relative point during oxidation at which the maximum volume of oxygen is adsorbed and the general rubber characteristics of carbon blacks.

Carbon blacks may have individual identity insofar as the distribution of hydrogen throughout the ultimate particle is concerned. There may also be type identity. It is proposed that the dominant feature of a carbon black particle is its electrical character and this electrical character is identified by the relative number and distribution of hydrogen atoms throughout the particle and by the amount of oxygen associated at its surface.

10:55 A. M.—Processing of Channel Blacks in a GR-S Tread Stock. ***Gardner L. Brown (Goodyear Tire & Rubber Co., Akron, Ohio).***

A shortage of channel blacks was encountered in 1945 which necessitated some uncompensated blending of these blacks in order to meet production demands. Consequently, it was desired to know the processing effects resulting from the interchange of various channel blacks in an EPC-GR-S tread stock.

Three blacks, commonly known as medium and hard processing channel black and a conductive channel black, were substituted in a 45-part EPC-GR-S tread stock and compared with an EPC control. Factory runs showed higher Mooney viscosities, mixing temperatures and power requirements, higher extrusion temperatures and rougher tubing in the direction of EPC to HPC to CC.

Most of the differences noted were small but potential trouble was indicated in the case of Mooney viscosities and

tubing characteristics. It required 32.9% increase in total mixing time to make EPC and HPC tube nearly alike. Although the difference between EPC and MPC was smaller, an MPC tread tubed with a wide, thin sidewall would give trouble.

Large mixing volumes demand maximum processing efficiencies (i.e., the least possible amount of mixing). MPC, HPC, and CC blacks are a processing detriment in such a system.

11:15 A. M.—X-Ray Diffraction Studies of Some Synthetic Rubbers at Low Temperatures. *E. E. Hanson and G. Halverson (Firestone Tire & Rubber Co., Akron, Ohio).*

This paper was delivered at the High Polymer Forum held at Atlantic City, N. J., during the 111th Meeting of the American Chemical Society, April 14-18, 1947. An abstract was published in the April, 1947, issue of RUBBER AGE.

11:40 A. M.—Thermodynamics of Crystallization in High Polymers. *Paul J. Flory (Goodyear Tire & Rubber Co., Akron, Ohio).*

This paper was delivered at the High Polymer Forum held at Atlantic City, N. J., during the 111th Meeting of the American Chemical Society, April 14-18, 1947. An abstract was published in the April, 1947, issue of RUBBER AGE.

Tuesday Afternoon—May 27th

2:00 P. M.—Vulcanization of Rubber. I. Stoichiometry of the Cross Linking Reaction. *B. C. Barton and E. J. Hart (U. S. Rubber Co., New York, N. Y.).*

This paper was delivered at the High Polymer Forum held at Atlantic City, N. J., during the 111th Meeting of the American Chemical Society, April 14-18, 1947. An abstract was published in the April, 1947, issue of RUBBER AGE.

2:25 P. M.—Sulfur Linkage in Vulcanized Rubber. IV. Further Studies on the Reaction of Methyl Iodide with Sulfur Compounds. *M. L. Selker.* V. The Acetone Extraction of Vulcanizates. *M. L. Selker and A. R. Kemp (Bell Telephone Labs., Murray Hill, N. J.).*

Further Studies on the Reaction of Methyl Iodide with Sulfur Compounds: The removal of combined sulfur from vulcanized rubber as trimethyl sulfonium iodide on treatment with methyl iodide at room temperature has been persuasive evidence of the presence of sulfide sulfur linked to allylic type residues. The evidence offered in the past did not constitute exclusive proof since it was not known whether still other types of sulfur linkage than those investigated would also yield trimethyl sulfonium iodide. The present work adds to the known list of methyl iodide reactions those with *n*-butyl methallyl sulfide, allyl disulfide, allyl tetrasulfide, *n*-propyl tetrasulfide, and trithiane.

In 160 hours at 24°C. only very small amounts of trimethyl sulfonium iodide are produced by any of the above-mentioned sulfur compounds. Only the *n*-butyl methallyl sulfide linkage reacts with methyl iodide at a rate comparable to the rubber-sulfur vulcanizate reaction. The product however is the dimethyl *n*-butyl sulfonium iodide not the trimethyl salt. It is therefore unlikely that any of the sulfur linkages studied here is responsible for the rapid production of trimethyl sulfonium iodide from vulcanizates. The case for the presence of the diallylic sulfide linkage in rubber-sulfur vulcanizates is thereby strengthened.

An important factor has been neglected in the methyl iodide-vulcanizate experiments. No evidence was obtained that all the sulfur removable by the reaction was in the form of trimethyl sulfonium iodide. The reacted vulcanizate was always acetone-extracted before analysis. This extraction may have decomposed those sulfonium compounds whose hydrocarbon residues were the rubber chains. Future experiments should distinguish between sulfur removed as trimethyl sulfonium iodide and that removed as decomposition products of other sulfonium salts.

The Acetone Extraction of Vulcanizates: Study of the olefin-sulfur system in order to gain insight into the chemistry of sulfur vulcanization is now firmly established. Effort must be made however to obtain experimental verification of the facts derived from the simple system, on the vulcanizate itself.

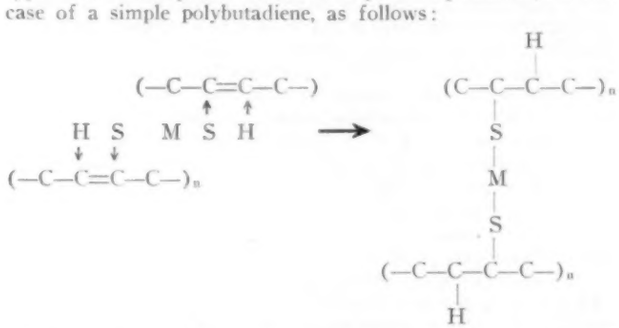
The presence of polysulfides in vulcanizates is indicated by their predominant role in the products of the olefin-sulfur reaction. Present experiments involving hot acetone and cold isopentane extraction of a rubber-sulfur vulcanizate lend no support to the idea that polysulfides, if present, decompose on hot extraction to give extractable free sulfur.

However, hot acetone extraction increases the reactivity of rubber-sulfur stock towards methyl iodide. This is especially striking in the mercuric iodide catalyzed reaction. This increased removal of sulfur from acetone-extracted vulcanizate as compared to unextracted vulcanizate can be explained on the basis of conversion of polysulfides to more reactive sulfur links on hot acetone extraction.

Natural and GR-S ebonites lose about one-third of their combined sulfur on methyl iodide reaction at 24°C. with production of trimethyl sulfonium iodide. No evidence was obtained for the presence of polysulfides in 32% sulfur natural ebonite.

3:00 P. M.—Sulfur Bond in Vulcanizates—Part III. Vulcanization by Dimercaptans. *C. M. Hull, Louis A. Weinland, S. R. Olsen and Wesley G. France (Ohio State University, Columbus, Ohio).*

In the previous papers of this series, it was proposed that crosslinking during sulfur vulcanization may occur in part through mercaptan (or RS—) addition to double bonds. According to this proposal it should be possible to effect crosslinking by means of a bifunctional mercaptan $M(SH)_2$ where M represents a hydrocarbon or other type of bivalent radical. This, in fact, has proved to be the case. Thus, both natural rubber and GR-S have been subjected to vulcanization of this type. Presumably the reaction may be represented, in the case of a simple polybutadiene, as follows:



The following dimercaptans were prepared and used in this investigation: ethylene, trimethylene, tetramethylene, pentamethylene, decamethylene, bis (2-mercaptoethyl) ether, bis (2-mercaptoisopropyl) ether, and 1, 3-dimercaptobenzene. The proportion of dimercaptans used was about 12 millimoles per 100 grams of GR-S. They were added dropwise as soon as the black stock smoothed out on the mill. Reaction takes place with extreme ease between GR-S and the lower molecular weight dimercaptans on a cold, tight mill, leading, in some cases, to severe scorching. Natural rubber behaves similarly but less rapidly.

The vigorousness of the reaction is an inverse function of the molecular weight in the polymethylene series. Substantial tensile properties were developed by the action of the dimercaptans on GR-S. Experiments with the use of filters for controlled photoactivation of the gelling of GR-S cements with dimercaptans have shown that only light below 5000 Å units is effective.

3:20 P. M.—The Action of Certain Organic Accelerators in the Vulcanization of Rubber. IV. Electronic Effects. *G. D. Kratz and I. Katz (Norwalk Tire & Rubber Co., Norwalk, Conn.), and* H. H. Young, Jr. *(Columbia University, New York).*

The effect of accelerator structure and alterations in it are summarized. Anilines, phenylene diamines, thioureas, and guanidines were used in the comparisons made. Resonance in

the molecule or its substituted groups was found to be of primary importance.

For aniline, methyl aniline, and dimethyl aniline, the logarithms of their dissociation constants were found to bear a linear relationship to the sulfur combined. The same relationship was found for the o-, m-, and p-phenylene diamines. Replacement effects of resonant and aliphatic groups in the latter series are compared.

Similar relationships were found to occur in the substituted thioureas, the resonant phenyl group decreasing the activity of acceleration as compared with an aliphatic group in the same position. The accelerating effect of the substituted thioureas was found to be of the following order: alkyl> dialkyl> allyl> phenyl> diphenyl. Currently, dissociation constants for this series are not available.

The accelerating activities of phenyl substituted guanidines lies in the order of their dissociation constants MPG> DPG> TPG, with the first two fairly close together, the last much lower. TPG and guanidine, with a 40,000-fold difference in their dissociation constants, produce comparable acceleration.

Results with sodium hydroxide compare with those for guanidine. Evidently these very strong bases exercise a different effect than the weaker bases, and an explanation for the sharp distinction in accelerating behavior needs to be found. Despite the 40,000-fold difference in their dissociation constants, guanidine and TPG should be capable of the same sort of resonance, and their similar low-order capacity for acceleration may have a related explanation.

3:45 P. M.—Effect of Certain Antioxidants in GR-S. I. Oxygen Absorption Studies. ***Hugh Winn and J. Reid Shelton (Case School of Applied Science, Cleveland, Ohio).***

Comparison of the rates of oxygen absorption by GR-S polymers and vulcanizers with varying amounts of phenyl-β-naphthylamine indicates that the optimum concentration is about 1 percent. Higher concentrations of this antioxidant result in an increased rate of oxygen absorption during the constant rate stage, and thus the excess antioxidant functions as a catalyst for this stage even though it is at the same time delaying the start of the autocatalytic stage of oxidation.

Coagulation of GR-S by the alum method is shown to result in a considerably greater resistance to oxidation as compared to a polymer coagulated by the salt-acid method. The difference is much less in the case of the vulcanizates although the alum vulcanizates are shown to absorb oxygen at a somewhat slower rate in all cases studied.

Oxygen absorption measurements demonstrate a considerable difference in the effectiveness of three common antioxidants. It is also shown that the rating of antioxidants as determined in GR-S polymer may be completely reversed when they are compared in the vulcanizates. Comparison of oxygen absorption data with the results of natural and artificial aging, as presented in Part II which follows this paper, shows good correlation and demonstrates the value of the oxygen absorption method for evaluating antioxidant activity.

4:05 P. M.—The Effect of Certain Antioxidants in GR-S. II. Natural and Accelerated Aging. ***Harry E. Albert (Firestone Tire & Rubber Co., Akron, Ohio).***

A concentration of 1% of phenyl-β-naphthylamine appears to give maximum protection to GR-S during both natural aging (5 years) and oven aging (4 days at 90°C.) of the polymer. No advantage could be shown for using larger concentrations but .5% of this antioxidant gave inferior protection.

In the case of 2, 2, 4-trimethyl-6-phenyl-1, 2-dihydroquinoline, a concentration of about 2% was necessary for maximum protection to the polymer during natural and oven aging.

In polymer aging, phenyl-β-naphthylamine gave somewhat better protection than dimethylacridane, heptylated diphenylamine or 2, 2, 4-trimethyl-6-phenyl-1, 2-dihydroquinoline.

In vulcanizate aging, there were only small differences between different concentrations of antioxidants and the different antioxidants evaluated.

Where these comparisons were possible, there was good correlation between the results of this part of the paper and the oxygen absorption studies of Part I.

4:20 P. M.—The Behavior of Silastic on Aging. ***R. K. Selfridge, G. M. Konkle, and P. C. Servais (Dow Corning Corp., Midland, Mich.).***

Silicone elastomers, like other silicone materials, are built on a molecular skeleton of alternate silicon and oxygen atoms. The inherent stability of this silicon-oxygen linkage implies unusual resistance to change or deterioration caused by aging. Stability studies were, therefore, made by exposing compounded dimethyl silicone elastomers, known under the trade name of Silastic, to conditions which commonly cause organic rubbers to deteriorate.

Among the conditions which generally cause temporary or permanent change in natural or synthetic organic elastomers are high and low temperatures, exposure to oils, chemicals, and weathering, including the combined action of ultraviolet radiation, moisture, ozone, and oxygen. The stability of Silastic was determined by measuring changes in tensile strength, elongation, hardness, elasticity, weight, volume and flexibility after long exposure to conditions which generally cause other rubbers to deteriorate.

These tests show that silicone rubber does have unusual resistance to change after prolonged exposure to temperatures as high as 300°F. and as low as —70°F. These tests also show that Silastic is exceptionally resistant to change after long exposure to outdoor weathering, aging in a Weather-O-Meter, and after exposure to certain oils and chemicals.

Moreover, these tests give further support to the hypothesis that stability is inherent in the silicone polymer because resistance to one set of conditions is not developed by special formulation at the expense of resistance to other kinds of aging. Both high and low temperature stability, together with weather and chemical resistance, are found to be characteristic of these silicone elastomers.

Wednesday Morning—May 28th

9:00 A. M.—Stability of High Polymer Latices to Acidification. ***R. S. Barrows and G. W. Scott (E. I. du Pont de Nemours & Co., Wilmington, Del.).***

The presence of certain stabilizing agents makes it possible to acidify sodium rosinate dispersions of polychloroprene (neoprene) without coagulation. The activity of such stabilizing agents appears to be closely connected with their geometrical configurations. β-Naphthalene sulfonic acid is an effective material for this use, but α-naphthalene sulfonic acid is ineffective. Condensation of β-naphthalene sulfonic acid with formaldehyde increases its effectiveness, but condensation of the α-isomer gives a coagulating agent. Condensation products of mixed naphthalene sulfonic acids are effective dispersing agents for neoprene latices provided a critical concentration of 15 to 18% of α-naphthalene sulfonic acid in the mixed acids is not exceeded.

Examination of a selected number of toluene and xylene sulfonic acids shows that a methyl group meta to the sulfonic acid group increases the dispersing activity, but methyl groups in ortho or para position do not. It is believed that both α- and β-naphthalene sulfonic acids can be absorbed on the colloidal particle, but that only the β-isomer can produce a closely packed film. Examination of molecular models supports this hypothesis.

9:15 A. M.—Latex "Strainability" Test. ***P. D. Brass and D. G. Slovin (U. S. Rubber Co., Providence, R. I.).***

This paper describes a latex test, the "strainability," which is useful for processing of latices and latex compounds.

The presence of fine coagulum in latex affects some processes very adversely. This coagulum is often wrongly blamed on some complicated chemical or physical action in the compound when the true explanation is that all the larger particles were present in the original latex or pastes from which the compound was made. The latex "strainability" test measures the amount of latex that will pass through a filter medium before clogging.

The equipment required and the method of making the test

are described. Factors affecting test results are discussed. Examples are given of the use of the test in the control and handling of raw latex, in the development of improved pastes for latex compounding, and in studying the interactions of ingredients within a latex compound.

9:30 A. M.—The Brabender Plastograph in the Rubber Laboratory. ***A. E. Juve and D. C. Hay (B. F. Goodrich Co., Akron, Ohio).***

The Brabender Plastograph is a small jacketed internal mixer so designed that the torque required to turn the rotors in the material being handled can be recorded on a strip chart. One of these instruments has been modified in several respects to make it more suitable for handling rubbers. The breakdown rates of natural rubber and GR-S were compared in this modified instrument, over a range of temperatures from 100°C. to 160°C.

Butadiene-styrene (72/28) copolymers prepared in a range of Mooney values using dodecylmercaptan (DDM) and mixed tertiary mercaptan (MTM) when tested in the Plastograph at 150°C. showed that the rate of softening decreased with an increase in Mooney value and that the type of modifier had an important effect on the rate of softening. The Plastograph results in this case were confirmed by factory processing experience.

The effect of chemical peptizing agents on the rate of softening of various rubbers can be readily determined in the Plastograph. Typical curves obtained on both GR-S and natural rubber using RPA #3 and Pepton 22 are shown.

The small size sample required for a mastication test (approximately 60 cc) combined with the good reproducibility of successive tests on the same material makes this apparatus of considerable interest in the study of the performance of natural and synthetic rubbers under conditions resembling those prevailing in large scale processing equipment. While little work has been done on its use as a mixer it should also be of interest in the laboratory study of this operation.

9:45 A. M.—Scorch Rate and Cure Rate Measurements at Various Temperatures Using the Mooney Plastometer. ***Ross Shearer, A. E. Juve and J. H. Musch (B. F. Goodrich Co., Akron, Ohio).***

The time of heating required for scorching of a vulcanizable mixture to occur and the rate at which vulcanization proceeds beyond this point can be measured with good precision in a Mooney Plastometer. These rates may be determined over a temperature range to include both processing and curing temperatures.

A series of these tests was run on compositions including a pure gum natural rubber, a natural rubber tread stock, a GR-S tread stock, a GR-S stock compounded with inorganic pigments, a GR-I inner tube stock and a Hycar OR-15 tread type stock.

In order to calculate the temperature coefficients of the two rates it was necessary that the impressed temperature be accurately controlled and that the actual temperature of the specimen be known, especially during the warm-up period. A correction for the curing effect of the latter was necessary.

The temperature coefficient of the scorch rate for the composition tested was found to vary from 2.0 to 2.4 and the temperature coefficient of the cure rate from 1.4 to 2.3. The coefficient for the combined over-all rate varied from 1.9 to 2.3.

As a check on the Mooney cure procedure a method was used for curing thin sheets over a range of times and temperatures with negligible time lag in attaining the impressed temperatures. Several of the test compositions were cured in this way and from the stress-strain data obtained the temperature coefficient of the cure rate was calculated. The agreement between this figure and those obtained from the Mooney data was good and shows that the Mooney cure procedure at different temperatures can be used as a very fast method for determining the temperature coefficient of either the scorch or cure rate.

10:05 A. M.—Comparison of Creep with Some Conventional Aging Methods for Elastomers. ***M. C. Throdahl (Monsanto Chemical Co., Nitro, West Va.).***

Elastomers behave in a very complicated manner when subjected to mechanical stresses. From recent theoretical researches of Tobolsky and co-workers it appears that the chemical reactions at elevated temperatures causing oxidation and cross-linking in elastomers are fundamentally exhibited by creep and stress relaxation measurements. These interrelated functions have been used in this paper as a convenient means of studying the relative behavior of antioxidants and accelerators in Hevea and GR-S rubbers.

Tests conducted on several representative Hevea rubber stocks containing different pigments show that creep behavior differentiates more clearly between antioxidants than do conventional aging tests. Creep measurements show that the relationships between the effectiveness of various antioxidants are independent of the accelerator or state of cure. Different accelerators in Hevea stocks containing the same antioxidant are found to have widely different creep rates which correlate well with conventional aging data.

Creep tests are also shown which differentiate GR-S tread stocks containing various antioxidants, although conventional aging tests indicate them to be alike. The relationship of continuous creep behavior with continuous and intermittent stress relaxation is shown in a typical Hevea vulcanizate containing permutations of three types of antioxidants with three types of accelerators. By either method the rating of the antioxidant is the same for all three types of accelerators.

10:30 A. M.—Effect of Storage and Temperature of Flexibility of Natural and Synthetic Rubber. ***John B. Gregory (Frederick S. Bacon Labs., Watertown, Mass.), Irving Pockel (Cambridge Industries, Inc., Cambridge, Mass.) and John F. Stiff (Binney & Smith Co., New York, N. Y.).***

A new method for measuring the flexibility of rubber is described. The method essentially consists of determining the stress-strain curve obtained by loading and unloading a loop formed from a 1" x 6" strip cut from a test slab. A stiffness coefficient independent of the thickness of the sample and a resilience coefficient are obtained.

Using the method described, the behavior of various natural and synthetic rubber gas mask facepiece compounds is studied during one to three months' exposure at various temperatures down to —20°F. Progressive stiffening probably due to crystallization is shown for natural rubber, GR-I, and GR-M compounds at the low temperatures. No tendency to crystallize was noted for the GR-S compound. Of the crystallizable polymers, GR-I was the most resistant and GR-M the least resistant to low temperature storage.

The effect of crystallization and second-order transition on the changes in flexibility due to storage at low temperatures is illustrated and discussed. Disregarding the inherent differences between elastomers, the low temperature resistance of elastomer compounds is indicated to be favored by use of interpolymers, full cure, and low-temperature-resistant plasticizers.

10:55 A. M.—A Study of the Frictional Properties of Tread Type Compounds on Ice. ***F. S. Conant, J. L. Dum and C. M. Cox (Firestone Tire & Rubber Co., Akron, Ohio).***

Apparatus and techniques for the measurement of coefficients of dynamic and static friction of tread type stocks on ice are described. Both coefficients are shown to increase with increased age of the ice or with a decrease in temperature. An increase in vertical loading pressure decreased the dynamic value more than it did the static.

In general, very little relationship was found between coefficients of friction on ice and hardness, stiffness or hysteresis defect. The coefficients are shown, however, to be very sensitive to type and amount of softener or black. In such cases the softer stock usually gave higher values. Hevea, acid emulsion butadiene/styrene, polyisoprene and GR-S/Hevea blends gave higher coeffiicents of friction than did any of the other polymers studied.

In some cases ice pick up is shown to decrease the coefficient of dynamic friction. Correlation with road test results show the laboratory test to be valid. It is also shown that the coefficients of both dynamic and static friction must be high to insure superior tire performance on ice.

11:20 A. M.—Quantitative Estimation of GR-S in Rubber Reclaim. ***D. S. le Beau (Midwest Rubber Reclaiming Co., East St. Louis, Ill.).***

The amount of GR-S present in reclaim is of technological interest to the rubber compounder. Inasmuch as GR-S practically does not take part in the formation of acetic acid by chromic acid oxidation its quantitative estimation in mixtures with natural rubber could be worked out on the basis of the rubber hydrocarbon content by difference, representing the sum total of polymers present, and that by direct analysis. Analysis of a series of experimental reclaim mixtures proved the direct rubber hydrocarbon a function of the natural rubber present. However, when introducing the values for the rubber hydrocarbon by difference into the calculations considerable errors in estimation were found rendering the method useless.

It is well known to the reclaiming industry that for one and the same natural rubber reclaim the values obtained for the rubber hydrocarbon content by difference and by direct analysis deviate from each other, the latter being usually smaller than the former. Critical examination of data obtained from a great number of natural rubber reclaims over a period of years revealed that the size of this deviation can be traced to the origin of the scrap used in the particular reclaim, each kind of scrap (peel, carcass, tires) causing a characteristic deviation. Tentative chemical explanations are given for the deviation.

If this deviation is introduced in the form of a correction factor the method of estimating GR-S in reclaim mixtures as outlined above becomes accurate enough to be applicable (error ± 2.5% polymer).

11:40 A. M.—Reclaiming Agents for Synthetic Rubber. ***W. S. Cook, H. E. Albert, F. L. Kilbourne and G. E. P. Smith, Jr., (Firestone Tire & Rubber Co., Akron, Ohio).***

With the advent of synthetic rubbers during the recent war emergency, the problem of reclaiming these new products became of vital interest to the rubber industry. Preliminary experiments showed that the methods previously used for reclaiming vulcanized natural rubber scrap were ineffective when used on vulcanized butadiene-styrene type copolymers, such as GR-S. Hence, it was found necessary to discover and utilize chemicals which would act as active reclaiming agents in catalyzing the reactions taking place during the reclaiming operations for GR-S.

Materials which have been used as reclaiming agents, both in this country and abroad, have been aryl mercaptans and high molecular weight aliphatic amines. This communication reports the results of a number of tests in which it is shown that certain highly alkylated phenol sulfides are among the most active reclaiming agents known. Their use in the correct proportions, together with the proper swelling agents and tackifiers, has resulted in the production of reclaims from GR-S and other synthetic elastomers which compare favorably with natural rubber reclaim in processability, compatability and physical properties, both cured and uncured.

A discussion of the mechanism of the reclaiming processes for both natural and synthetic rubbers based on the available evidence, indicates that the predominant chemical reaction taking place during the reclaiming process is one of oxidative degradation or chain scission. The reaction is similar to the oxidative chain scission taking place during the natural and accelerated aging of hydrocarbon polymers. This oxidative degradation probably is catalyzed by the reclaiming agent through a radical chain mechanism.

Bonding Buna Rubbers with Diisocyanates

THE Office of Technical Services of the U. S. Department of Commerce recently made available a report on "Polyurethanes." The report, originally presented in Frankfurt, Germany, in 1941 by Dr. Otto Bayer, of I. G. Farbenindustrie, was translated and prepared by G. M. Kline and I. G. Callomon of the National Bureau of Standards, and was made available by the Office of Technical Services as Report PB-12635. It includes references to experiments made in the bonding of the German Buna rubbers with diisocyanates. The portion of the report devoted to these investigations is reproduced herewith:

In the field of rubber we tried to replace the sulfur used in vulcanizing Buna by the addition of diisocyanates to Buna copolymers containing hydroxyl groups or to polyisobutylenes containing hydroxyl groups. We observed that Buna S itself reacts with diisocyanates. The question has not been answered whether the relatively small amount of oxygen-containing substances in Buna, the reactive double bonds or CH_2 groups, respectively, are the cause. (Fumarates do react with isocyanates.)

During this investigation we made the important observation that these vulcanized materials adhere very strongly to the metal parts of the vulcanizing press. The practical application of this phenomenon produced a long sought bonding agent to make possible attachment of Buna to any surface. The thorough investigations of our Rubber Laboratory showed that with the help of diisocyanates, normal Buna-sulfur mixtures can be attached to iron, light metals, porcelain, etc., with heat-resistant joints.

The diisocyanates prepared with *m*-tolylenediamine and hexamethylenediamine, which are marketed under the trade names Vulkollan T and H, respectively, are the best for this purpose. These products made it possible to produce the caterpillar treads for tanks and high-grade bonded products without the addition of natural rubber.

At present Leverkusen is attempting to produce by the use of these Vulkollans a tire from metal cords and rubber which has never been accomplished due primarily to poor binding between rubber and metal. If they succeed, a tire with high heat resistance, which can be recapped as often as desired, would be created for the Volkswagen. (EDITOR'S NOTE: This is the cheap automobile which was promised to the German people.)

The good adhesiveness of the Buna-diisocyanate mixtures also made possible the production of a new construction material for airplanes which had been suggested by the Gotha Waggon Fabrik. It consists of a thin sheet of vulcanized fibre cemented to a sheet of light metal. The vulcanized fibre or the metal fails before the joints. This material, consisting of light metal at the outside and cellulose at the inside, makes it possible to construct a metal airplane like a wooden one. The construction of a heavy bomber would require only two-thirds of the man-hours now used. This new core material will also be much more bullet proof than light metal without the lining.

After the war the material can also be used for the construction of automobile bodies. Also, vulcanized fibre with a Buna coating would be useful in the manufacturing of tropical luggage.

Canadian Rubber Division Meets at Banff on June 10

THE Spring Meeting of the Rubber Division of the Chemical Institute of Canada will be held at Banff, Alberta, Canada, on Tuesday, June 10, in conjunction with the Thirtieth Annual Conference of the parent organization. The Conference will be held from June 8 to 11, and will include technical sessions of various divisions, the annual meeting, special luncheons, a Symposium on Western Resources, and the annual dinner. A special post-conference tour has also been arranged.

The Rubber Division will hold its sessions at the Banff Springs Hotel. Seven technical papers are scheduled for presentation, four at the morning session and three in the afternoon. Further information on the plans of the division can be secured from J. T. Black, of the Polymer Corporation, Sarnia, Ontario, acting secretary of the division. Further details on the over-all Conference can be secured by writing to the Conference Office, 818 Nineteen Avenue West, Calgary, Alberta. Abstracts of the seven papers scheduled for presentation at the meeting of the Rubber Division, including their authors and company connections, follow herewith:

Abstracts of Papers

The Mechanism of Popcorn Formation. *C. A. Winkler (McGill University, Montreal, Quebec).*

A kinetic study of popcorn formation in solutions of butadiene in styrene indicates that the free radicals necessary for the polymerization are produced initially on the seed by decomposition of hydroperoxides. A further reaction involving opening of double bonds in reacting chains leads also to radical formation. The function of butadiene is to supply double bonds to the chain and thus enable branching to occur.

The Preparation of Controlled Molecular Weight Distribution of Butadiene-Styrene Copolymers Using Tertiary C_{16} Mercaptan as Regulator. *H. Leverne Williams (Polymer Corp., Ltd., Sarnia, Ontario).*

Synthetic rubber is produced largely by reaction of the hydrocarbon monomers in aqueous emulsion stabilized with soap. The molecular weight and the molecular weight distribution is regulated by the addition of various compounds, notably mercaptans. The mercaptans vary in their effects widely, and some, namely the tertiary C_{16} mercaptans, disappear more slowly so that their effective concentration remains more nearly constant at least for a relatively longer period of time than for other mercaptans. This more uniform regulating action may be utilized to prepare synthetic rubbers with narrower molecular weight distributions than production GR-S.

The Effect of Temperature and Mixed-Solvent Composition on the Intrinsic Viscosity of GR-S. *L. H. Cragg and T. M. Rogers (McMaster University, Hamilton, Ontario).*

The intrinsic viscosity of a sample of standard GR-S has been measured, at temperatures ranging from 0° to 65°C., in several solvents made progressively "poorer" (to the point of precipitation) by the addition of non-solvent. The results afford strong evidence in support of the theory (Flory: Alfrey, Bartovics and Mark) that intrinsic viscosity is very sensitive to the shape assumed by a flexible long-chain molecule in solution. Measurements with various systems of the type GR-S-solvent-non-solvent indicate that the intrinsic viscosity at the precipitation point is the same with different non-solvents and, to a first approximation, with different solvents. This intrinsic viscosity is, moreover, independent of temperature.

Combined Ratios of Monomers in Bulk and Emulsion Copolymerizations. *K. R. Henery-Logan, Maurice Morton, and R. V. V. Nicholls (McGill University, Montreal, Quebec).*

The copolymerization equation of Mayo and Lewis [*J. Am. Chem. Soc,* Vol. 66, p. 1594 (1944)] has been shown in these laboratories to describe the bulk and emulsion copolymerizations of styrene, acrylonitrile butadiene, isoprene and chloroprene, using two monomers at a time. The compositions of copolymers prepared in emulsion were found to be independent of catalyst, modifier, phase ratio and air inhibition. Evidence was obtained that the same free-radical mechanism applies to both bulk and emulsion copolymerizations and that true copolymer chains are formed in both systems. The relative reactivity of the five monomers with each of the five radical-types was found to be specific for each radical.

Some Recent Developments of the British Plastics Industry. *P. A. Delafield (Distillers Company Limited Group of Plastics Companies and British Geon, Ltd., England).*

Mr. Delafield has called upon his broad background in the plastics industry to discuss in this paper certain specialty applications which have been developed in the United Kingdom for plastics of various types. These examples will cover all of the major types and will not be limited to any one field.

As a result of his position as Deputy Controller of Plastics during the war, he was closely associated with many interesting war-time developments in the plastics field. Information on many of these special applications has not been hitherto fully published.

One of the most interesting subjects to be covered will be the use of polyvinyl chloride paste for molding and fabric coating work. This product has been pioneered in England and is only now being introduced on a production scale in Canada and the United States.

The Mechanism of Sodium Catalyzed Polymerization of Butadiene in Toluene. *R. E. Robertson and Leo Marion (National Research Council, Ottawa, Ontario).*

Attempts to obtain evidence supporting a free radical mechanism for the sodium "catalyzed" polymerization of butadiene in toluene failed. Indirect evidence is presented to support the initial formation of a disodium addend with butadiene. This is followed by either the addition of another molecule of butadiene or far more frequently by transmetallation with toluene to give sodium benzyl. The high proportion of phenylalkyl chains indicates that the major part of the polymerization involves chain initiation by sodium benzyl and chain termination by reaction with toluene to regenerate the sodium benzyl.

The Physical Testing of Experimental Elastomers. *S. T. Bowell and N. R. Legge (Polymer Corp., Ltd., Sarnia, Ontario).*

Equipment and methods used to test experimental and control type elastomers are described. Problems involved in testing experimental polymers are discussed, with particular reference to the effects of the mechanical or thermal breakdown which is required before compounding pigments can be added to the polymer on a laboratory mill. The processing step is often sufficient to alter the molecular characteristics of the polymer radically and thus prevent correlation of polymerization and physical test data. Results of variation of the components of tread stock formulae are reported. Experimental methods and results for butadiene-styrene type copolymers are described for the following tests: (a) stress-strain, (b) rebound, (c) flex crack resistance, (d) extrusion, (e) low temperature stiffening, (f) rate of retraction.

Editorials . . . . . .

Permanent Legislation

NOW that temporary legislation has been enacted extending specification control over rubber products and restoring free and open importing of natural rubber, action to create permanent rubber legislation is gaining momentum in Congress. Some legislators are of the opinion that such legislation may be placed on the statute books before the summer congressional recess. Majority opinion, however, seems to favor withholding permanent legislation until after the summer recess. In any event, plans are being made to introduce at least one bill in the next several weeks. The House is taking the lead in this instance.

Two major problems face the legislators, namely, how much synthetic rubber capacity should be kept in operation for national security purposes and what regulations should be maintained to guarantee such output? With regard to capacity, the Inter-Agency Rubber Policy Committee has suggested that a minimum production of 250,000 tons per year be maintained. Most industry leaders originally agreed with this figure, but there has been a change of heart in some cases in recent months. John L. Collyer, president of the B. F. Goodrich Co., for example, is known to favor a figure closer to 150,000 tons. Mr. Collyer contends that all factors being equal synthetic rubber will hold its own percentage-wise in a free and non-controlled market.

That sentiment is growing in favor of continuing indefinitely under law the use of at least 30 percent synthetic rubber was revealed recently by Representative Paul Shafer (Republican, Michigan), chairman of the House Armed Services Subcommittee. Mr. Shafer has quietly been collecting rubber industry opinion on permanent legislation and is planning to get hearings started on proposed legislation within the immediate future. He is among those who believe that it is both expedient and possible to enact permanent legislation before the summer recess.

It is known that at least two proposed bills have been submitted to the House sub-committee, one authored by Rep. Fred Crawford (Republican, Michigan) and the other by Rep. Leslie C. Arends (Republican, Illinois). These are the same two who authored bills subsequently enacted into the present temporary legislation, with Mr. Crawford's bill serving as a basis for the new law (Public Law No. 24, 80th Congress).

The newly-proposed Crawford bill for permanent legislation would set up a rubber supervisory board of some kind, with the secretaries of the War, Navy and State departments serving on the board. In addition, it would establish a full-time rubber director, authorize quotas to be set for manufacturers to assure use of prescribed minimum amounts of synthetic rubber, and provide penalties for rubber manufacturers who failed to abide by such quotas.

Some leaders of the industry have expressed apprehension over the proposals contained in the Crawford bill, particularly with regard to the establishment of a supervisory board. They point out that if a full-time rubber director is named his functions might be controlled by the supervisory board and with authority vested in two separate entities confusion might easily arise. Others object to setting up a full-time rubber director on the grounds that it would create another bureau. Few objections are raised to the proposed quota system to assure consumption of the synthetic rubber produced or to the proposed penalty system for violation of any quota system.

Some activity with regard to permanent rubber legislation is also indicated on the part of the Senate. Senator John W. Bricker (Republican, Ohio), chairman of a banking sub-committee on rubber, has talked to several rubber industrialists and has asked them to submit their ideas on permanent legislation. To date, he has received few responses. One interpretation that may be put on this is that the industry prefers waiting, now that the government monopoly on the importation of natural rubber has ended, to see how synthetic rubber will compete price-wise with natural rubber privately purchased.

Fears of a sharp rise in natural rubber prices after termination of the government purchase program have been completely dispelled. The question now being asked is how far down will such prices go before the end of the year. While there has been no precipitous drop in the free rubber market as yet, a progressive decline has been witnessed. This situation may easily hold up permanent rubber legislation until after the summer congressional recess.

PACE SETTER IN THE DEVELOPMENT OF CARBON BLACKS

...TO MATCH INDUSTRY'S PROGRESS IN RUBBER COMPOUNDING

STATEX-93
TENSILE

ALWAYS THERE IS A *Leader*

COLUMBIAN CARBON COMPANY

400 TONS OF SMOKE A DAY

COLUMBIAN CARBON CO. • BINNEY & SMITH CO.

MANUFACTURER DISTRIBUTOR

TENSILE

Tensile tests on a Statex-93—GR-S tread compound at room temperature show results such as would be expected with carbon of six-acre surface. Values are approximately 80% of those developed by the same loading of Micronex in GR-S.

Tested at higher temperatures similar to those developed in road service, tensile figures for Statex-93 treads are substantially the same as for Micronex treads. Tests at 220° F show full equivalence between Statex-93 and EPC type channel carbon.

When specimens are subjected to flexing prior to testing another striking characteristic of Statex-93 is revealed — tensile does not fall off as rapidly as in the case of compounds containing channel carbons.

We will be pleased to furnish further information.

MICRONEX *For 35 Years*
the Standard Reinforcing Carbon

STATEX-B *The Carbon*
for Dynamic Reinforcement

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The High Resilience Carbon

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CURRENT NEWS OF THE MONTH

SURVEY OF RUBBER INDUSTRY ISSUED BY STANDARD & POOR'S

A survey of the earning prospects and markets of the rubber industry as a whole and comparative analysis of the financial position and stocks of eleven individual rubber manufacturers is contained in a report made available recently by the Standard & Poor's Corp., 345 Hudson St., New York 14, N. Y.

According to the report, tire shipments for 1947 should approximate the peak 1946 level, since the expected slack in replacement demand in the second half of the year should be largely offset by increased original equipment demand. Sales value of tires are expected to decline because of the larger proportion of original equipment business, the re-introduction of lower priced lines, and the likelihood that some price weakness in the replacement tire field will develop once supply and demand come into balance. On the other hand, non-tire activities are expected to be up greatly and, barring strikes within the industry, or in important supplying and customer groups, over-all dollar sales close to the peacetime record set in 1946 are indicated.

Factors pointing to a decline in 1947 dollar sales of tire manufacturers will also exert pressure on operating margins, the report points out, particularly in view of further increases in labor and material costs. However, while declines in earnings from the exceptional 1946 results are generally indicated for tire producers, profits on near-peak sales should still be extremely favorable. Contributing factors will be lower tax rates for companies reporting on other than a calendar year basis and possible reduction or elimination of large reserves.

Danger of Over-Capacity

In forecasting the longer term prospects, it is indicated that sales of tires and tubes will again be subject to wide cyclical fluctuations. Moreover, as soon as supplies come into balance with demand, the problem of over-capacity, which has been intensified by wartime and postwar additions to facilities, will probably become acute. Thus, there is a distinct possibility that the adverse effect of lower sales on earnings will be aggravated by a recurrence of the price wars characteristic of the industry in the past. Conversely, the earnings base of many companies will be broadened by the development of new products, particularly in the growing plastic field and, in some instances, through extension of non-rubber activities.

Contrary to the long-term outlook for the tire business, the report states that growth prospects for other types of rubber products are bright. The beneficial effect on rubber companies' profit margins is cited as a particularly encouraging angle to the long-term upward sales trend of miscellaneous rubber products. Since such products are sold to several different industries, there is not the concentration of buying power found in the automobile group, and margins are considerably wider than those obtainable from tire sales.

Turning to the prospects for the reclaimed rubber industry, the report predicts a decline in production and consumption of reclaim as total rubber demand recedes. However, the material is expected to continue to hold an important place in the over-all picture, since price stability contributes to its value as a raw material and reclaim excels natural rubber for some uses, primarily in mechanical and industrial rubber lines, because it is less absorbent of solvents and is more easily processed.

BANQUET TICKETS

The banquet in connection with the meeting of the Rubber Division, A.C.S., to be held in Cleveland, Ohio, on May 26, 27 and 28, will be held on Tuesday evening, May 27, at the Hotel Carter. Charles W. Carvin, vice-president of the Industrial Rayon Corporation, will be the featured speaker. Entertainment will also be provided. Advance tickets for the banquet, which will sell at $5.00 each, can be secured from C. J. Harwick, Harwick Standard Chemical Co., Akron 8, Ohio.

Government Sets Latex Prices

New prices have been established by the Office of Rubber Reserve on natural liquid latex. Reflecting the increased cost of acquisition of latex stocks on hand and afloat as of April 30, 1947, the new prices, which do not include the uniform freight charges, are as follows; *Normal Latex* (approximately 38-40%)—tank car lots, 30¾c per pound; carload drums, 33c; less carload 10 drums, 33½c; 1 to 10 drums, 34c; less than 1 drum, 40c. *Centrifuged Latex* (approximately 58-63%)—tank car lots, 32½c per pound; carload drums, 34¼c; less carload 10 drums, 34¾c; 1 to 10 drums, 35¼c; less than 1 drum, 41¼c. Prices of special crepes will be announced in the near future.

REVISION OF RUBBER ORDER R-1 PERMITS LARGER INVENTORIES

An increase in permissible inventories has been provided by the Civilian Production Administration (the functions of which have since been taken over by the Office of Materials Distribution of the Department of Commerce). Under the terms of Rubber Order R-1, as revised May 1, 1947, manufacturers may now carry a 90-day supply of natural rubber as compared with 60 days previously, a 60-day supply of any kind of American-made rubber as against 45 days, and a 45-day supply of reclaimed rubber as against 30 days.

The revised order also permits the use of larger quantities of natural rubber in 65 groups of products. The permitted increase in the amounts of natural rubber used each month, however, will be less than 3 percent. Among items permitted greater percentages of natural rubber are brake linings, brake blocks, clutch facings, conveyor and elevator belting, food closures, friction tape, footwear, thread and surgical tape.

New items now permitted to use natural rubber for the first time, under the revised order, include beverage closures, blasting equipment, embalmers' supplies, hard rubber balls, hard rubber drug sundries, household and commercial health products, and telephone and telegraph insulators.

Amendments to Appendix II

Previously, on April 18, CPA announced amendments to Appendix II of Rubber Order R-1, under which manufacturers of medium size passenger car tires (6.50 cross section) were given permission to use a greater proportion of natural rubber. The permitted amount for this size tire was increased from the previous figure of approximately 3 pounds to approximately 8 pounds.

The amendments also permitted producers of camelback for recapping truck tires (8.25 and larger size tires of 6-inch die width and 14/32 gauge and up) to use as much natural rubber as they chose in the production of such camelback.

Other changes made by the amendments allow manufacturers a choice of natural rubber materials in all types of solid tires, rubber tracks and track blocks, the latter two items being used on tractor-type automotive equipment. In addition, manufacturers are granted a choice of natural rubber materials in the production of all tubes except those of 15-inch and 16-inch diameter, which will continue to be manufactured with American-made rubber.

OLD AND NEW RUBBER TOYS IN ABUNDANCE AT TOY FAIR

The Forty-Fourth American Toy Fair, held in New York City from March 10 to 22, featured the products of well over 900 manufacturers and attracted a record number of some 10,000 visitors. The Hotel McAlpin, headquarters for the Fair, devoted seven floors to the displays, in addition to displays maintained at the Fifth Avenue Building, with its permanent sales offices, the Hotel Breslin, and numerous other locations.

The Fair witnessed the return of hundreds of well-known rubber toys and novelties and the introduction of dozens of new rubber items. Whereas previous toy expositions had featured two or three latex skin type dolls only, the present Fair had virtually dozens of such dolls on display. Companies featuring such dolls, with names such as "rubber skin," "wonder skin," "angel skin," etc., included Vanity Doll Co., Jolly Toys, Inc., Arranbee Doll Co., Associated Toy & Doll Factories, Majestic Doll & Toy Corp., and Imperial Crown Toy Co. The well-known "Magic Skin" doll of the Ideal Novelty & Toy Co. was also on display.

Rubber balloons and novelties of all sizes, shapes and decorations were on view. Among companies showing such items were the Oak Rubber Co., Maple City Rubber Co., Hub Rubber Co., and the Van Dam Rubber Co. Oak Rubber also exhibited its new line of popular squeeze-me toys, including a quarter of such toys put up in a combination counter display box. Both Hub Rubber and Van Dam Rubber showed new lines of inflatable playballs. The Maple City line included figure balloons, squawkers, punching bags, etc.

The varied lines of rubber playthings featured by the Sun Rubber Co., Auburn Rubber Corp., and Seiberling Latex Products Co. were in evidence. The Sun Rubber exhibit included dolls, tanks, armored carriers, airplanes, blocks and other molded specialties, as well as volley balls, soccer balls and basketballs. Auburn Rubber showed its extensive line of "Arco" rubber toys, including autos, pistols, tractors, hatchets, knives, etc. Also shown were the numerous combination sets offered by this company. The Seiberling Latex exhibit featured bounce toys in particular.

The famous line of Kaysam neoprene toys was shown by Molded Latex Products, Inc. Also displayed at this exhibit was the "Joyball," a new, large, all-purpose, inflatable ball, molded of latex by the Kaysam process. After inflation the valve on this ball pops into a recess flush with the surface of the ball, leaving no projection on the surface. A complete line of playballs, including baseballs, was displayed by the Aviation Products Co. This firm also showed the "Atom Ball Parachute," a new novelty item which operates as a miniature parachute.

Several new toys and novelties were shown for the first time by the Eastern Rubber Specialties Co., including whistle toys, the Suz-ee doll, and dog toys. Also shown were two new 12-inch jumbo latex characters, a "darkie" doll, and a small drink-and-wet doll molded in one piece. The exhibit of the firm of Fashiondol, selling agent for Latexture Products, Inc., included several sewing sets featuring rubber mannequins, as well as several large size mannequins intended for display purposes.

Coming Events

May 24. Southern Ohio Rubber Group, Outing, Inland Gun Club, Dayton, Ohio.

May 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Cleveland, Cleveland, Ohio.

June 16-19. A.S.M.E. Semi-Annual Meeting, Stevens Hotel, Chicago, Ill.

June 16-20. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 20. Akron Rubber Group, Outing, Turkeyfoot Golf Club and Sandy Beach Park, Akron.

June 27. New York Rubber Group, Annual Outing Blasberg's Grove, Hawthorne, N. J.

June 27. Boston Rubber Group, Annual Outing, Woodland Golf Club, Newton, Mass.

Sept. 15-19. A.C.S., 112th Meeting, New York City.

Sept. 18. Southern Ohio Rubber Group, Dayton, Ohio.

Oct. 3. Boston Rubber Group, Hotel Somerset, Boston.

Dec. 12. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston.

Dec. 18. Southern Ohio Rubber Group, Dayton, Ohio.

Introducing Philblack-O

The Philblack Division of the Phillips Petroleum Co., Akron 8, Ohio, will start sampling Philblack-O, its new hard furnace black, within the immediate future. The samples will come from pilot plant production which has been maintained for the past several months so that manufacturers can evaluate the material fully before the production plant now under construction starts operating. Present indications are that the plant, which will have a capacity of some 3,000,000 pounds a month, will begin operations next September. The new black is especially recommended for use in tire treads. Early abrasion tests indicated that on a Huber angle abrader the abrasion loss is 6.3 cc for 50 parts loading of Philblack A, 4.8 cc for MPC, and 3.8 cc for Philblack-O. This indicates roughly 20% better wear and tire tests are reported to have indicated roughly the same performance. Flex life is approximately 85% better. A laboratory report on the performance of Philblack-O is available from the company.

WAGE AND HOUR DIVISIONS REPORT ON RUBBER VIOLATIONS

The 1946 annual report of the Wage and Hour and Public Contracts Divisions, U. S. Department of Labor, shows that violations of the minimum wage, overtime and child labor provisions of the Fair Labor Standards Act and the Public Contracts Act were found in 71 percent of the 300 inspections made in the rubber products manufacturing industry during the year ended June 30, 1946. As a result $106,000 in back wages was returned to some 2,400 underpaid employees.

Not all rubber products manufacturers were inspected during the year, because the Divisions are able to make complaint, selective and spot-check investigations in only a part of the nation's establishments in all industries covered by the two laws. However, the inspections in the rubber industry were sufficient to show that employers in this field still are in rather widespread violation, despite the fact that the vast majority apparently desire to comply, with only a small number of so-called "chiselers" remaining in industry as a whole.

The report further shows that violations of the overtime provisions of the two laws were the most common type found. It also was revealed that 17 percent of the inspected employers in the rubber products industry had violated the minimum wage provisions of the Fair Labor Standards Act—the Wage and Hour Law. Back wages for violations of the 40-cents-an-hour minimum wage provision of this law—failure to pay $16 a week for a 40-hour week—were paid to nearly 300 employees. Seven percent of the inspected employers had violated the Child labor provisions of the laws.

The Divisions report a frequent cause of unintentional violations is misapplication by employers of the exemption provisions of the Wage and Hour Law, under which certain employees may be exempt from the law's minimum wage and overtime provisions as "executive," "administrative" or "professional" employees. As most manufacturers know, the Wage and Hour Law applies to all employees engaged in interstate commerce or in the production of goods for interstate commerce, and the law's provisions for a 40-cents-an-hour minimum wage and time and one-half for overtime work bevond 40 hours a week apply in all cases unless an employee is specifically exempt. The Public Contracts Act applies generally to employees engaged in filling Government contracts for over $10,000.

Gee Appointed Research Director

Geoffrey Gee, a staff member of the British Rubber Producers' Research Association, Welwyn Garden City, Herts., England, has been appointed director of research of the Association, succeeding J. Wilson who resigned recently. The appointment became effective on April 1, 1947.

FARBENINDUSTRIE OFFICIALS INDICTED AS WAR CRIMINALS

The United States Government indicted twenty-four officials of I. G. Farbenindustrie on May 3, charging them with fomenting and waging aggressive war, mass murder and plunder and spoilation. Filed in Nuremberg by Brigadier General Telford Taylor, chief United States war crimes prosecutor in Germany, the 20,000-word indictment—accusing industrialists of aggressive warfare for the first time in history—named some of Germany's most prominent pre-war industrialists.

The document charged that the world's largest chemical company, through cartel agreements, had prevented United States concerns from shipping essential war materials, including synthetic rubber, magnesium, synthetic nitrogen, tetrazene, atabrine, and sulpha drugs, to Great Britain and other Allies until the United States entered the war. Standard Oil Co. of New Jersey was one of several United States companies named in the indictment as having cartel agreements with Farben.

These cartel arrangements were said to have been part of a Farben plan to limit the production of strategic materials in potential enemy countries, including the United States. The indictment accused the Farben officials of participation in the preparation for World War II through their support of and cooperation with Adolph Hitler and his Nazi regime. The document also charged them not only with the responsibility for the deaths of millions of human beings but also with the enslavement of other millions as well.

Farbenindustrie was said to have provided 100% of Germany's supply of synthetic rubber, gasoline, methanol, and lubricating oil. Its assets were conservatively estimated at more than six billion marks, with a payroll of 250,000 persons in 1943 and sales reaching considerably more than three billion marks.

The indictment recited that every phase of Farben production had been synchronized with the military plans of the German High Command from a very early date and had continued until the surrender in May, 1945, to equip the German war machine for aggression.

Linked to Oswiecim Massacres

Farben involvement in the mass murders at the infamous Oswiecim concentration camp composed a special phase of the indictment. It was revealed that around 1940 Otto Ambros, chief of the Chemical Warfare Committee for the Ministry of Armaments and War Production, and manager of Farben's Oswiecim plant, in consultation with Fritz ter Meer, chief of the technical committee personally charged with the production of poison gas, recommended that a new buna plant be constructed in Oswiecim. This was done with eight to twelve thousand laborers procured from the concentration camp during the following year. Farben agreed to pay the SS one and a half to four marks a day for various classes of labor from Oswiecim. The lowest rate was for children.

In 1942 Farben constructed an additional camp near Oswiecim, called Monowitz, adjacent to its buna plant site. This cost Farben 5,000,000 marks. "In the administration of the Monowitz concentration camp," the indictment charged, "Farben set up a special punishment division to which were sent workers who did not conform to the murderous requirements of production efficiency imposed by Farben. As a result of such action, beatings and other forms of corporal punishment were administered and in many cases the workers were sent to the extermination chambers at Birkenau.

"Working conditions at the Farben buna plant were so severe and unendurable that very often inmates were driven to suicide by either dashing through the guards and provoking death by rifle shot or hurling themselves into the high tension electrically-charged barbed-wire fences," the indictment revealed. "As a result of these conditions the labor turnover in the buna plant in one year amounted to at least 300%. Besides those who were exterminated and committed suicide, up to and sometimes over 100 persons died at their work every day from sheer exhaustion."

Standard Denies Charges

Robert T. Haslam, vice-president of the Standard Oil Co. of New Jersey, denied the statement in the indictment that cartel agreements between his company and I. G. Farbenindustrie caused a delay in the development and production of buna rubber in the United States until 1940. He asserted that there were no cartel agreements which restricted prices or production.

In 1929-30, when the Weimar Republic ruled in Germany, the companies made an agreement for the exchange of patents which, the Standard Oil official said, did not delay the production of buna rubber in this country. He added that the agreement actually had worked out to the great advantage of the United States, giving this country 100 octane gasoline and toluol for TNT before the war.

"The Germans never made a pound of synthetic rubber from the butyl process they got from us," he stated, "They did not have the raw materials. Buna rubber was developed almost wholly in Germany. Farben gave us part of the buna process in 1930, before Hitler, and the rest by 1939. Proof of this is seen in the fact that when the United States decided to build buna plants, those plants got into production immediately."

GIANT CONDUCTIVE RUBBER PAD SPEEDS TEXTILE DRYING PROCESS

A gigantic electric heating pad built of conductive rubber by Goodyear Tire & Rubber Co., Akron, Ohio, is being used successfully by Textile Printers of California, Los Angeles, to speed the drying process of thousands of yards of printed fabrics. Said to be the largest rubber heating unit ever made for commercial use, the 30-foot pad functions as a table top drying element, enabling multiple colors to be printed on textiles in one continuous operation. Formerly, 18 hours drying time was required for each color used. Similar application of this new heating principle is possible in several types of color-printing operations, such as wallpaper designs, according to E. W. Sanders of Goodyear's Mechanical Goods division. Still other uses are also conceivable.

MINUTES OF RUBBER CONSULTING TECHNICAL COMMITTEE MEETINGS

We continue herewith our policy of publishing the minutes, either in full or part, of meetings of various consulting technical committees with government officials. Two things must be remembered in connection with these minutes: (1) They cover that portion of the meetings attended by representatives of the Office of Rubber Reserve; (2) By nature of their purpose the meetings do not reflect the favorable side of synthetic rubber.

Meeting of the Wire and Cable Consulting Technical Committee. Held: January 29, 1947. Government Presiding Officers: Aden R. Miller (OTC-CPA) and L. A. Woerner (ORR). Chairman, R. A. Schatzel (Rome Cable).

At the outset of the meeting the wire and cable industry was congratulated by OTC-CPA on the fact that it had, through cooperation with the producers of GR-S and diligent efforts, recognized the value of synthetic rubber. GR-S used by the companies represented was indicated as from 45 per cent to 95 per cent of their total rubber usage.

One company reported, "Many of us are more interested in getting sufficient quantities of GR-S rather than natural rubber. We find it superior in many respects." Another reported, "We have practically lost the know-how to work with natural rubber. In many cases our men have refused to work with natural rubber because they found it more difficult to handle." Still another stated, "Had natural rubber been available in unlimited quantities during the war, we still would have had to have neoprene (GR-M). Neoprene was as important a military necessity as was rubber of any type and will continue to be."

(EDITOR'S NOTE: At this point Rubber Reserve representatives presented a summary of current work on research and development, specifications, and production rearrangement as a matter of information for the committee. A good deal of this information has been covered in previous committee meetings, the minutes of which have been published. The committee was advised that the production of GR-S-65 was being shifted gradually from Institute to Firestone-Port Neches. The committee urged that GR-S production be continued at Naugatuck, since this polymer was widely accepted by the wire and cable industry).

In the general discussion the Committee indicated the factors listed below as the most important characteristics to be considered in a GR-S for their use:

1. *Good processing:* Naugatuck GR-S was considered the best of the available types. Institute GR-S-65 caused some difficulties, and in some cases had to be blended with Naugatuck GR-S or GR-S-60. Several companies reported that Institute GR-S-65 contains hard spots in a softer matrix which were practically impossible to eliminate in breakdown. So-called "Crows feet" or "Bamboo Canes" characterize the cured insulation. This matter is under investigation.

2. *Faster curing rate:* Generally speaking, GR-S is somewhat slower curing than natural rubber. GR-S-AC is the slowest curing polymer of the GR-S types. X-344 (which is a non-staining variation of GR-S-60), X-362 and X-363, all of which are stabilized with IBUL or its sodium salt UBUF, are faster curing than standard GR-S. Rate of cure is particularly important for GR-S to be used in continuous vulcanization techniques.

3. *Good physical properties:* GR-S-60 and other cross-linked polymers, X-344 and X-363, would be expected to have slightly lower physical properties than the standard GR-S types. However, a reduction in acceleration ratio in mineral pigment in some cases will improve the physical properties.

4. *Low water absorption:* Lower water absorption rubbers generally produce insulation compounds having superior electrical properties. However, extremely low water absorption polymers are required only for specialty applications which would not cover more than 20 per cent of the total rubber used by the industry. It is worth noting that very low water absorption GR-S may be obtained at no price differential from the standard types, whereas a premium price has been established on natural rubber types (deproteinized) having very low water soluble materials. X-361 has been developed, and is being sampled to the industry, having extremely low water absorption characteristics comparable to deproteinized or washed natural rubber.

5. *Non-staining:* Reports on existing non-staining GR-S types indicated that several improvements were desired. GR-S-25, which is stabilized with EFED, has excellent non-staining properties, but has an odor which is somewhat disagreeable to workmen handling it. GR-S-50 has very good aging properties, resulting from the use of Stalite as a stabilizer, and while it has much better non-staining characteristics than standard antioxidants, it is not as good as GR-S-25 in this property. Many products in the electrical lines are manufactured without knowing whether they will be called upon in service to be non-staining. In such cases, a non-staining polymer must be used as a safeguard.

6. *Uniformity:* GR-S polymers in general are credited with a much greater degree of uniformity than natural rubbers. Processing and rate of cure, particularly, are included under this designation. Rubber Reserve is continuing to strive toward improved uniformity of all factors contributing to improved GR-S. Naugatuck GR-S was considered by the Committee to be more uniform than Lake Charles GR-S-AC and Institute GR-S-65 less uniform than either.

Based upon the above factors as well as an anticipation of the needs of this group, a series of experimental polymers have been or are being made for laboratory and factory evaluation.

A non-staining variation of GR-S-65, having similar low-water-absorption and a slightly faster rate of cure, has been prepared with the Naugatuck finishing process as X-362.

A non-staining, low-water-absorption GR-S-60 for use in improving the processing characteristics (milling, calendering and tubing) in blends with other non-staining GR-S types or natural rubber has been scheduled with Naugatuck finishing process as X-363.

A preliminary report on X-363 indicates a higher Mooney than this objective and Williams' plasticity and recovery which corresponds to other similar polymers. X-363 is also a low-water-absorption variation of X-344. It should be noted that dry polymers stabilized with UBUF will contain the same antioxidant as those stabilized with IBUL since the UBUF is reconverted to IBUL in the process. UBUF is being used in place of IBUL in several cases because of greater ease in handling.

In view of the present curtailment of production of dry polymer at Naugatuck, the Committee asked that the development of wire and cable GR-S be placed in a southern plant. Since production of GR-S-65 has recently been transferred to Firestone-Port Neches (Texas), two modifications of GR-S-65 have been scheduled at Port Neches as X-364 and X-365 in an attempt to obtain processing characteristics by changing polymerization conditions similar to that produced by the Naugatuck finishing line.

A very low-water-absorption GR-S comparable to deproteinized natural rubber has been prepared as X-361 by coagulating standard GR-S with a special alum process designed to keep water soluble material at a minimum. A preliminary report on water absorption of X-361 at 70°C., indicates 0.63 milligrams per square centimeter after 24 hours and 2.24 mg/cm² after 9 days. The Mooney viscosity is 60. This can be adjusted if the evaluation reports show a desire for improved processing characteristics.

An experimental pilot plant non-staining type GR-S PB-70202A9A, stabilized with antioxidant R-2015, is expected to have improved heat aging characteristics compared to GR-S-25 and better non-staining properties than GR-S-50. PB-70202A9A is available for sampling to the industry.

Samples of X-361 up to a limit of 200 pounds and PB-70202A9A in 10-pound lots may be obtained upon application to the Chemical Products Division, Goodyear Tire and Rubber Company, Akron, Ohio. No permit requests will be required, although a report on evaluation tests shall be made to Rubber Reserve as on all other experimental polymers.

Experimental lots of not over 75 pounds of X-364 and X-365 may be procured by application for purchase permits to the Sales Division of the Office of Rubber Reserve. Five-pound samples only of X-362 and X-363 will be available to those who have not previously ob-

tained purchase permits. The production of the above polymers was made possible by the cooperation of this Committee and its visitors in underwriting sufficient production to justify the use of regular production facilities.

The Committee's attention is also directed to the fact that latex masterbatches of mineral pigments have been reported to result in better modulus, tensile, elongation, rebound, and slightly better tear resistance, when compared to mill mixing. The hardness remains about the same. Extrusion rates are faster and processing as measured by tubing index is improved, although swell at the die is slightly greater. X-315 containing 50 parts Silene EF per 100 parts GR-S-25 is now available for evaluation. Masterbatches of this type are particularly desirable for pigments which are difficult to incorporate in mill or banbury mixing. If other type pigments are desired, an expression of that opinion should be forwarded to Rubber Reserve either through the Committee chairman or individually.

The industry might also find GR-S-16 (formerly X-272) of interest in specialty applications where a low-water-absorption and high-Mooney GR-S-10 type would be applicable. GR-S-16 has a rosin soap emulsification, 95-105 Mooney, glue-acid coagulation, and Stalite stabilization. This polymer could be of value alone or in blends with GR-S-50 or X-274 in providing increased body in uncured stocks, slightly higher tensiles with mineral pigments, and higher cured hardness. X-274 is a Stalite stabilized GR-S-10 at 55 to 65 Mooney. Both should reduce tendency of rosin soap polymers to stick to mill because of higher Mooney.

Rubber Reserve is establishing a standard reference lot of GR-S-65 to be designated as X-346 WC in an attempt to coordinate and improve test methods (water soluble ash, plasticity-recovery and water absorption) on polymers for wire and cable consumption. Ten-pound samples of X-346 may be obtained by application for sales permits to the Sales Division of Rubber Reserve after April 1, 1947.

Effective on or before March 1, 1947, a reduction of antioxidant from approximately 1.5 per cent to approximately 1.25 per cent in the production of regular, special purpose and experimental GR-S polymers will be made. This reduction does not apply to carbon black or other pigmented masterbatches, or to non-staining type polymers stabilized with EFED.

Antioxidants are incorporated in GR-S polymers to stabilize the raw polymer before compounding rather than to protect the end product from oxidation. This reduction is due primarily to the seriously limited availability of certain antioxidants. Unless otherwise stated in the production authorizations, published monthly in the trade magazines, the antioxidant content of all GR-S polymers, including experimental types established after the above date, will conform to this policy.

R. E. HARMON

The Egg and Rubber

A fresh egg dropped from the roof of the New York Hospital in New York City landed without breaking on a soft cellular rubber pad with a three-inch thickness. A 100-foot drop was involved. Eggs which landed on the rubber target bounced as high as 25 feet. The demonstration, arranged by the U. S. Rubber Co. took place before a group of scientists studying the mechanical factors that cause injuries in aviation accidents. Cellular rubber derives its cushioning capacity from millions of microscopic cells filled with nitrogen—250,000 per cubic inch.

Transfer CPA Rubber Division

Activities and functions of the CPA Rubber Division, which has been operating as a unit of the Office of Temporary Controls, have been transferred to the Rubber Division of the Office of Materials Distribution of the Department of Commerce, Washington, D. C. The transfer was made in accordance with Executive Order 9841, dated April 23, which calls for the liquidation of the Office of Temporary Controls by June 1, and provides for handling of existing regulations by the Department of Commerce. The Office of Materials Distribution was established by Department Order No. 69, dated May 4. OMD consists of an Office of the Director and Rubber, Chemicals, Metals, Cordage and Liquidation divisions. The Rubber Division, headed by W. James Sears, who directed the CPA Rubber Division, will carry out functions "under the provisions of the Joint Resolution to strengthen the common defense by maintaining an adequate domestic rubber-producing industry (Public Law 24, 80th Congress) and administer rubber orders and regulations issued pursuant to Title III of the Second War Powers Act of 1942, as amended."

German Rubber Industry Improving

The German rubber manufacturing industry is definitely "on its way up" and there is no reason why it should not compete "in a relatively short time" with the American industry in most markets of the world, according to a recent statement attributed to E. J. Thomas, president of the Goodyear Tire & Rubber Co. Mr. Thomas was one of a group of 15 of the nation's industrial leaders who recently spent three weeks in Germany on a special survey of the industrial and export problems of the combined American-British zones. The survey was made at the request of the War Department.

SYNTHETIC RUBBER ACTIVITIES REVEALED IN MELLON REPORT

According to the latest report of its activities issued by the Mellon Institute, expenditures for pure and applied research in the period from March 1, 1946, to March 1, 1947, totaled $2,697,982. The average tenure of fellows now in the Institute is 7.2 years, and of all research personnel, 5 years. Eighty industrial fellowships were in operation during the 1946-47 period, 30 individual and 50 multiple.

According to the report, the multiple fellowship on catalysis, initiated in 1944 by the Office of Rubber Reserve, curtailed its investigations on the butadiene-from-alcohol process early in 1946 and was assigned a program on controlling by instruments the commercial production of synthetic rubber.

The purpose of this new project is the eventual instrumentation of the GR-S process of manufacturing synthetic rubber from butadiene and styrene, the main endeavor being devoted to the continuous process, and gratifying progress has been made. The importance of this work, according to the report, is apparent upon realization that the batch processes used throughout the war are gradually being converted into continuous operations, for which there is need of more adequate methods of control to enable constant and uniform daily production.

The report also referred to the multiple fellowship of the Firestone Tire & Rubber Co., which has been concerned for a number of years with the study of the chlorinated products from commercial synthetic rubber and more especially from synthetic rubbers made specifically for chlorination. Throughout the course of this work the ultimate goal has been a product of great stability. A result of this program, the report indicated, is a new type of chlorinated rubber characterized chiefly by its flexibility and toughness as compared to ordinary commercial chlorinated rubber.

The report also revealed that a number of fellowships intermitted during the war, including fellowships on carbon black and new plastics, will enter upon work just as soon as the right personnel and facilities become available.

Conductive Rubber Heaters

The production of electrified ceiling panels, consisting of a heating element of conductive rubber sandwiched between two thin layers of plastic, was recently announced by the U. S. Rubber Co. At the same time, the company revealed that it is developing portable conductive rubber heaters in the form of decorative screens to provide temporary heat in bathrooms, bedrooms, and other parts of the house inadequately heated by present methods. The supply of these heaters, it was indicated, will be limited for several months due to the current shortage of materials and production facilities.

TECHNICAL PAPERS FEATURE RUBBER SESSIONS AT OHIO SAFETY CONGRESS

More than one hundred representatives from rubber companies throughout Ohio and adjoining states attended each of the two rubber sessions at the Seventeenth All Ohio Safety Congress held on April 15 and 16 at the Deshler-Wallick Hotel in Columbus, Ohio. The attendance was the highest in the history of these rubber meetings and the sessions were said to have been the best held to date.

Glen D. Cross, safety director of the Firestone Tire & Rubber Co., was this year's chairman of the rubber sessions. Also on the program committee were C. H. Workman, safety director of the Pharis Tire & Rubber Co., George Burkhardt, safety director of the General Tire & Rubber Co., and John R. Kumpel, representative of the U.R.W.A.

Cook Presents First Paper

The first paper presented at the rubber sessions was given by C. B. Cook, vice-president of the Elwell-Parker Electric Company, who talked on the subject, "How Industrial Truck Manufacturers Can Make Trucks Safer to Operate." Mr. Cook pointed out that the average industrial truck built today has many safety features. These include guards to protect the truck operator from falling objects in the case of the lift truck and guards to protect his feet and legs when he operates the truck from a position at the rear of the unit. Then, there is the dead man control, which means that if the operator should drop off the truck, everything stops as the motor is cut off and the brakes are applied.

Mr. Cook stressed the necessity of developing a national standard code which would help make uniform the types of guards and the methods of controlling industrial trucks. At the present time, the method of operating trucks differs widely, a fact that leads to confusion and accidents in plants where trucks of different makes and models are used. Unless a national code is developed each state will have a different code, which will create a headache for both manufacturers and users of trucks.

Next on the program was a talk by Mr. P. W. Watt, manager, factory service division, B. F. Goodrich Company, Akron, on the subject of "The Training and Supervision of Industrial Truck Operators." Mr. Watt outlined the industrial truck program at the Akron plants of Goodrich. In this program, all trucking operations come under the centralized control of the Transportation Department. Weekly safety meetings of all foremen in the Transportation Department are held to discuss all accidents, serious or minor, that have occurred. Unsafe practices observed are also pointed out.

In training new truck operators a regular program is used. First the new operator is brought to the foreman who explains the safety aspects of the job. Then the new driver is assigned to a teacher or trainer. For a period of a week the new employee does not operate the truck, but rides with the trainer on the truck as it is driven to all parts of the plant. For the next week, the new driver is assigned to another teacher and is permitted to operate the the truck as the trainer rides with him on the truck. He is assigned to jobs out in the yard. For the third week, the new driver is placed on his own in a department where the hazards are at a minimum. During this period, his foreman observes his operations closely and if he does all right he is put on as a regular trucker.

After a general discussion of safe truck operations led by R. W. Fickes, assistant safety director, Goodyear Tire & Rubber Company, F. S. Mallette, industrial hygienist of the Firestone Tire & Rubber Company, talked on the subject of "Industrial Hygiene in the Rubber Industry."

Mr. Mallette discussed primarily the difference between comfort standards and toxicity standards of solvents used by rubber companies. He pointed out that toxicity standards are formulated by exposing animals to different concentrations of the materials, by observing results on human beings in actual production areas such as was done in the case of silicosis, or by having human volunteers expose themselves to harmful materials to see how much they can stand.

As the result of such experiments and research work, standards have been published by various states and some cities. An effort is being made to have all such standards published and promulgated by the American Standards Association. Such standards are toxicity standards and often do not take into consideration the problem of the comfort of the individual. More and more consideration is now being given to the comfort of the worker, because if a worker is not comfortable he will not be efficient or a satisfied worker. Harvard College has run a number of experiments to find out more information about comfort standards.

After Mr. Mallette's talk a discussion of the subject was led by W. E. McCormick, industrial hygienist, the B. F. Goodrich Co., Akron.

Paper on Use of Color

The second session got underway with a talk by N. A. Mason, supervisor of maintenance sales, Pittsburgh Plate Glass Company, Pittsburgh, Pa. Mr. Mason talked on the subject, "Use of Color To Increase Safety In Industry." He stated that the color on a machine, on the wall, or on a traffic lane can have a marked influence on a worker's morale, his rate of production, and his regard for safety. The medical profession has long realized that color can be used to stimulate or depress. Some colors assist people to relax and be cheerful. Others stimulate and invigorate them, and still others set up irritation and actual physical discomfort.

Gloom and glare also come into the picture. Both cause strain, nervous tension, physical wear, and both can be greatly decreased by the proper use of color. Color dynamics is concerned not only with the factory background of walls, ceilings, and floors, but also with the machines. Methods of painting machinery have been developed which reduce the danger of personal injury. Moving parts on machines are painted orange, which has a high attention value, to indicate danger points.

Vision and Safety in Industry

Next on the program was a talk on the subject of "Vision and Safety in the Rubber Industry" by Joseph Tiffin, Division of Education and Applied Psychology, Purdue University, Lafayette, Indiana. Mr. Tiffin's talk did not cover the eye protection angle, such as wearing goggles, but covered another phase concerned with the fact that people who do not see as well as they should, tend to have more accidents, on the average, than people who see better. People differ just as markedly in their ability to see as they do in height, weight, color of hair, etc. They may have eyes that are good for seeing close objects or eyes that can see objects at a distance.

The next portion of the program had to do with labor and management's cooperation in safety. Robert Maney, superintendent, Plant No. 1, Goodyear Tire & Rubber Company, Akron, spoke on this subject as a representative of management. Mr. Maney summarized his talk very well in his closing remarks. They were: (1) "You have to sincerely like people if you are going to be successful in dealing with them," (2) "You have to remember that their troubles are the most important in the world to them and that they deserve your respect and confidence just as much as you deserve their respect and confidence."

Labor's representative on this subject of cooperation in safety was Rex C. Murray, district representative, District No. 1, United Rubber, Cork, Linoleum, and Plastic Workers of America. Mr. Murray stated that the International Union had made it clear to all local unions that this problem of safety is not one to be considered as a phase of collective bargaining. He went on to say that we should not think in terms of bargaining when the health, life, and limb of the worker is involved. That is the reason why special safety and accident prevention committees have been set up, completely divorced from the problems of the general grievance committees within the local unions.

Mr. Murray stated that the union believes that the responsibility for accident prevention must still be charged to management. The union's responsibility must be one of cooperation.

BARUCH ADVOCATES RETENTION OF SYNTHETIC RUBBER PLANTS

To protect the American public against unreasonably high prices for natural rubber and as a defense measure, Bernard M. Baruch, who was chairman of the Rubber Survey Committee appointed by the late President Franklin D. Roosevelt in 1942, urged that the United States Government dispose of its synthetic rubber plants to private industry only with the understanding that they will be maintained in a standby condition. Mr. Baruch made this recommendation in New York City on May 2 while being presented a souvenir sample from the ten millionth bale of synthetic rubber made at the Government-owned synthetic plant at Institute, W. Va.

The United States never again should be placed in the position where a break in communications with the Far East will deprive it of an essential commodity such as rubber, Mr. Baruch said. "I believe that the synthetic product can be made under fifteen cents a pound and some persons say it may be nearer seven cents," he declared and added that he felt confident that synthetic rubber can be made cheaper in the United States than natural rubber can be produced abroad, especially if the foreign growers pay workers decent wages.

To assure that foreign rubber growers would not undersell the domestic manufacturers of synthetic rubber, Mr. Baruch suggested that the imposition of a tariff on natural rubber might be advisable if the plantation owners in the Far East persisted in their policy of paying workers ridiculously low wages. He pointed out that the cost of the synthetic rubber plants in the United States approximated $750,000,000 and expressed the opinion that they could be operated on a basis to yield a fair return on that investment and, if given an even chance, beat the natural industry both in cost and quality of production.

A.S.M.E. Division Meeting

The Rubber and Plastics Division of the American Society of Mechanical Engineers will hold a meeting on Thursday, June 19, at the Stevens Hotel in Chicago, Ill., in conjunction with the regular semi-annual meeting of the parent society. The full meeting will be held from June 15 through June 19. Three papers will be presented at the meeting of the division, as follows: *Motor Mount Testing Machine,* by Lloyd E. Muller (General Motors Corp., Flint, Mich.); *Factors Affecting Performance of Aircraft Hydraulic Packings,* by L. Y. Cheyney and T. J. McCusition (Battelle Memorial Institute, Columbus, Ohio); *Some Properties and Mechanical Applications of Compar,* by J. J. Hitov (Resistoflex Corp., Belleville, N. J.). Reservations for rooms at the Stevens Hotel should be made as early as possible.

Heads New Sharples Division

George R. Lawson

N. J. Hooper, vice-president in charge of sales of Sharples Chemicals, Inc., has announced the formation of a Rubber Sales Division. George R. Lawson, district manager of the New York sales office, has been appointed manager of the new division, with headquarters in the company's offices in Philadelphia. After graduation from Yale University in 1927, Mr. Lawson spent over seven years with the Hood Rubber Division of the B. F. Goodrich Company in Watertown, Mass., later becoming textile chemist with the Merrimac Hat Corporation in Amesbury, Mass. In 1938 he joined the Barrett Division of Allied Chemical and Dye Corporation in New York City, as a technical representative. During his eight years with that organization Mr. Lawson handled technical sales on organic chemicals and rubber compounding materials with two years as head of the rubber laboratory during the war. He joined Sharples in January, 1946, and has been Manager of the Eastern Sales Division since March of that year.

Start Production of GR-S-SP

In response to a concerted appeal from the wire and cable industry, the Office of Rubber Reserve has begun production at the Naugatuck (Conn.) GR-S plant of synthetic rubbers of the GRS-S-SP series. The SP suffix has been added to indicate the superior processing qualities of the Naugatuck elastomers. Production has been started on GR-S-SP, GR-S-SP-60, and GR-S-SP-65, and these polymers will be sold at 19¼ cents per pound, plus the applicable uniform freight charge. The higher price was said to be necessary to compensate for the higher production costs of producing these grades of rubber at Naugatuck as compared with production costs for standard grades at other locations.

U. S. RUBBER QUARTERLY SALES SHOW 40% GAIN OVER 1946

Consolidated net sales of the U. S. Rubber Co. in the first quarter of 1947 were approximately 40% ahead of the same period last year, Herbert E. Smith, president of the company, told stockholders at the annual meeting, held in Passaic, N. J., on April 15. The company's sales in the first quarter averaged just under $50,000,000 a month, which is at the annual record rate of almost $600,000,000 a year.

It is expected that practically all the company's factories will continue to operate at capacity throughout the year, Mr. Smith said, since shortages resulting from the war still exist in many rubber products, and a great potential market awaits new products. Although the demand for tires is approximately in balance with supply, this does not mean that the industry will produce a lot less tires this year than last.

The company plans to spend more than $28,000,000 this year for new plant and property and for rehabilitation of existing facilities, Mr. Smith declared. Approximately $24,000,000 was spent by the company for similar purposes last year. Under the 1947 program, two textile mills in Burlington, N. C., already have been purchased and are expected to greatly increase the company's capacity to produce a wide variety of new fabrics. The company also has purchased an important interest in the North British Rubber Co., Edinburgh, Scotland.

The 1947 program also calls for additional work on the expansion of the company's Mexico City, Mexico, tire plant, installation of new equipment at the Port Elizabeth, South Africa, factory, and spending of $2,500,000 on rehabilitation of Malayan rubber plantations.

Dayton Rubber Changes Name

Stockholders of the Dayton Rubber Manufacturing Co. voted at the annual meeting, held in Dayton, Ohio, on March 26, to change the name of the organization to the Dayton Rubber Co. by which the company is more readily known. At a meeting of the board of directors, following the stockholders' meeting, the quarterly dividend of 50c per share on Class A preferred stock and 30c per share on common stocks was voted. The dividend is payable to stockholders of record as of April 10.

Appoint Berlow and Schlosser

The Niagara Sprayer & Chemical Co., a division of the Food Machinery Corporation, has appointed the Berlow & Schlosser Co., Industrial Trust Building, Providence 3, R. I., as agents in the New England area. Niagara Sprayer is one of the largest producers of all grades of Rubbermakers Sulfur in the country. Warehouse stocks will be maintained in Boston for prompt and efficient service.

NEW YORK RUBBER GROUP HEARS TALKS BY LARRICK AND BOGARDUS

Lewis Larrick, director of the Department of Physics and Engineering of the Institute of Textile Technology, Charlottesville, W. Va., and R. B. Bogardus, assistant manager of the Plantations Division of the Goodyear Tire & Rubber Co., Akron, were the principal speakers at the Spring Meeting of the New York Rubber Group, held at the Hotel McAlpin in New York City on April 11, and attended by approximately 260 members and guests. Mr. Larrick spoke on "Fabrics for Mechanical Rubber Goods," while Mr. Bogardus discussed "Natural Rubber Recovery in the Far East."

Mr. Larrick, the first speaker, indicated that textile materials produced for mechanical rubber goods manufacturers need many qualities in addition to strength. These textile yarns or fabrics must also possess no infinite stress concentration at the interface between the textile product and the rubber in which it floats.

Since it is impossible to avoid stress concentrations at the rubber-textile interface completely, the speaker said, it is necessary to provide for adequate adhesion. The adhesion between natural rubber and cotton tire cord can no longer be taken as the standard of adequacy since the advent of man-made fibers, particularly rayon, and the synthetic rubbers.

Mr. Larrick pointed out that whereas it used to be thought that the adhesion of natural rubber to cotton was a mechanical bonding due to the inherent fuzziness of the cotton cord, newer developments have forced abandonment of this concept. The adhesion of synthetic rubbers to cotton tire cord is certainly not as great as the adhesion of natural rubber, he stated, although the fuzziness remains the same. Likewise, staple rayon cord is as fuzzy as staple cotton cord but the adhesion of staple rayon to natural rubber is of the same order of magnitude as the adhesion of continuous filament rayon. It may be that the explanation of the bond lies in the hydrophobic nature of the surface of greige cotton fibers, and the hydrophilic nature of the surface of rayon, nylon, etc.

Other requirements of the rubber industry for its textile products were described by Mr. Larrick as dimensional stability, elasticity or the ability to recover from deformation almost completely, the ability of the material to withstand and recover from repeated applications of stress far below the ultimate breaking point, and heat resistance.

Bogardus Reviews Rubber Situation

In his talk, Mr. Bogardus revealed that the Far East rubber producing areas are currently producing at about 65% of the pre-war production rate. The future rate of increase is expected to be slow unless the political troubles in the Netherlands Indies and Indo-China are quickly settled so that foreign capital can again flow into these areas and pre-war management can take over the operation of the Occidental properties in safety. In addition, the native rubber producing areas in South Sumatra must receive ample supplies of consumer goods at reasonable prices, particularly rice and textiles, in order to induce the natives of these areas to resume rubber production operations on a normal scale.

A further condition for increased production in these native areas is the removal of all trade barriers, Mr. Bogardus indicated, so that the rubber produced may be exported freely either to Malaya for processing and selection or to consuming countries.

Discussing the liquid latex situation, the Goodyear official pointed out that before World War II Malaya shipped about 22,000 tons per annum and the Netherlands Indies shipped 17,000 tons. At present the Netherlands Indies is out of the picture insofar as liquid latex is concerned. Previous bulking and shipping installations have been destroyed and the condition of equipment on the plantations in the interior is unknown and the worst is anticipated. It will take probably a year after the plantations have been restored to their former management to reinstall the necessary equipment, he said.

Liquid latex operations in Malaya are progressing and expanding, the speaker declared, and it is expected that about 15,000 tons will be shipped to the United States during 1947. The only other sizable source for this material is Liberia, which can be expected to ship 10,000 tons this year. Accordingly, the available supply to the United States this year may be only 25,000 tons. Surveys recently made by the Rubber Manufacturers Association were said to indicate a demand for this product during 1947 of approximately 40,000 to 50,000 tons at present prices.

Most of the shipping lines operating from the Far East to the United States were said to have equipped their steamers with special tanks to handle liquid latex in bulk, and terminals have been erected at ports in this country to receive such latex on arrival.

The principal future use of liquid latex is expected to be for the manufacture of foam rubber and those companies interested in its manufacture have high hopes for future expansion of demand for this type of product, according to the speaker. Some experts in this line were said to visualize the possibility of consuming 10,000 tons of liquid latex a month within the next few years, providing ample supplies are available at a cheap price.

Boston to Hold Outing June 27

The annual summer outing of the Boston Rubber Group will be held on Friday, June 27, at the Woodlawn Country Club in Newton, Mass. Bernard H. Capen, of the Tyer Rubber Co., Andover, Mass., is secretary-treasurer of the Group.

JOINT MEETING FEATURES TALK ON AUTOMOTIVE USE OF RUBBER

R. K. Williams, of the research laboratories of the General Motors Corp., Detroit, Mich., was the principal speaker at the joint meeting of the Buffalo Rubber Group and the Ontario Rubber Section of the Chemical Institute of Canada, held in the General Brock Hotel in Niagara Falls, Ontario, on April 22. Approximately 140 members and guests heard Mr. Williams discuss "Rubber in the Automotive Industry."

In his talk, Mr. Williams asserted that from 70% to 80% of the total rubber consumption goes into the automotive industry. In a 3,300-pound car, there are about 440 rubber parts, weighing 175 pounds. Of this rubber 70% is used in tires. The importance of these parts to passenger comfort and safety is out of all proportion to their weight percentage. The hydraulic brake is dependent upon rubber parts for its operation, he said, and all joints in the front suspension and steering systems which are exposed to road dirt are protected by means of oil resistant synthetic rubber seals.

Many of the present and coming developments depends upon natural or synthetic rubber for their utility, the speaker stated. Automatic and semi-automatic transmissions are made cheaper and better through the use of oil resistant synthetic rubber cups and packings to seal various pistons actuating the clutching mechanisms. These applications are unusually severe since they involve continuous operations in fluids at from 250 to 300° F. In such applications, the heat and oil resistance of present synthetics is being stretched to the very limit.

Discussing specifications for the various parts, Mr. Williams declared that these have been greatly improved through the joint efforts of committees of the Society of Automotive Engineers and the American Society for Testing Materials, which have drawn up and published classified tables containing identification numbers and physical properties of virtually every conceivable compound that would be used in the automotive and mechanical goods industries.

The S. A. E.-A. S. T. M. tables were said to have been found very useful in specifying the compounds for the numerous grommets used in each car. For example, harmonic balance grommets require high tensile strength, abrasion, tear, and cut resistance and low compression set due to the vibratory stresses imposed by their application. The same general method of specification is applied to other parts such as bumpers, windshield channel, etc. Special properties such as non-staining are handled by the use of a suffix to the identification number. Staining difficulties arise where the part comes in contact with painted or lacquered surfaces.

Mr. Williams concluded his talk by indicating the difficulties encountered in service in writing the specifications to meet the requirements.

Discuss Rubber Suspensions

The basic reasons why the Twin Coach Company has adopted Torsilastic rubber springs for the suspension system used in its buses and motor coaches were outlined by F. R. Fageol, chairman of the board of the company, in a talk presented during the National Transportation Meeting of the Society of Automotive Engineers, held in Chicago from April 16 to 18. Mr. Fageol's address was entitled "A Rubber Torsilastic Suspension System," and in it he outlined the major characteristics required of a satisfactory suspension system. In summing up he listed the following advantages offered by the Torsilastic system: (1) It permits the chassis to float without losing the "feel" of the vehicle; (2) Offers greater resistance to swaying or rolling of the vehicle; (3) Absorbs shock or impact from any direction; (4) Requires no bearings or other relatively moving surfaces needing lubrication; (5) Offers no possibility of abrasion, rusting or wearing action from dirt, road salt, water, mud, or any other condition which might arise during normal vehicle operation.

Offers $40,000,000 Issue

An underwriting syndicate headed by Kuhn, Loeb & Co. has placed on the market a new issue of $40,000,000 twenty-year 2-5/8% debentures, due April 1, 1967, of the U. S. Rubber Co. The debentures are priced at par plus accrued interest and are being sold to provide the company with additional working capital required to handle the present volume of business. The new debentures are subject to redemption at 103 for one year and at declining prices thereafter. A sinking fund has been set up to retire the whole issue by maturity.

Akron to Hold Outing June 20

The annual summer outing of the Akron Rubber Group will be held on Friday, June 20, at the Turkeyfoot Golf Club and Sandy Beach Park. Frank M. Andrews (Phillips) is chairman of the Outing Committee. The outing will depart from previous custom in that the golf tournament and entertainment will be held in the afternoon at the Turkeyfoot Golf Club, while the evening dinner and prize drawing is scheduled to be held at the Sandy Beach Park.

Leases Plant for Plastics

U. S. Rubber Co. has signed a long-term lease for a plant at 2638 Pulaski Road, Chicago, Ill., which will be used for the production of new plastic materials. Installation of machinery at the plant began in April and it is expected that manufacturing operations will start about July 1. Initial employment will total 300 persons, although this figure is expected to increase as production expands.

Quebec Group Hears Jahns

The April Meeting of the Quebec Rubber & Plastics Group, held at the Ritz-Carlton Hotel in Montreal, Quebec, on April 10, featured a talk by F. W. Jahns, Jr., of the technical control staff of the Continental-Diamond Fibre Co., Newark, Del., on "Engineering Properties of Some Laminated Thermosetting Plastics." In his talk, Mr. Jahns first gave a brief description of the resins used in the production of the laminates as well as the methods of production. He then discussed several of the newer types of laminated plastics based on the use of nylon fabric, felted asbestos, or woven glass fabric. He also touched on the dependence of the ultimate properties of the finished laminates on the kinds and relative proportions of the fillers and impregnating varnishes used.

Advances at Raybestos-Manhattan

The appointment of two new executives and a director was made at the annual stockholders' and directors' meeting of Raybestos-Manhattan, Inc., held in New York City on April 1. John H. Matthews, assistant general manager of the Manhattan Rubber Division, Passaic, N. J., since 1942, was appointed vice-president in charge of the Division, while O. H. Cilley, assistant general manager of the United States Asbestos Division, Manheim, Penna., was named a vice-president, and A. F. Heinsohn, general manager of the General Asbestos & Rubber Division, North Charleston, S. C., was appointed to the board of the company.

Southern Ohio Schedules Outing

The first annual outing of the Southern Ohio Rubber Group is scheduled to be held on Saturday, May 24, at the Inland Gun Club on Needmore Road near Dayton, Ohio. A full day of sports activities will be featured at the outing. Members of the Outing Committee include E. C. Dill, H. W. Guenther, V. K. Hitch, H. S. Karch, G. E. Lang, R. H. Marston, G. J. Wilson, and H. S. Mooradian. Russell J. Hoskin, of the Inland Manufacturing Division, General Motors Corp., 2727 Inland Ave., Dayton 1, Ohio, is secretary of the Group.

Ontario Group Elects Officers

At a meeting of the Ontario Rubber Section of the Chemical Institute of Canada, held at the General Brock Hotel in Niagara Falls, Ontario, on April 22, the following officers were elected: *Chairman,* J. P. Hooper (H. L. Blachford Co.); *Secretary-Treasurer,* D. F. Walker (Dunlop Tire). M. C. Bartlett (Canada Wire & Cable), G. Baxter (Firestone), and H. K. Cunliffe (Dominion) were elected members of the Executive Committee.

End Casto Creditor Agreement

The creditors' committee of the Casto companies organized under an agreement dated January 8, 1947, was recently ended as the result of an order entered by the Common Pleas Court of Washington County, Ohio, on April 7, appointing a special receiver for the Casto Company of Marietta, Ohio. The appointment of a special receiver for the Marietta Company prevented the orderly operation of the Casto companies as originally contemplated by the creditors' committee. An action has been instituted in the Circuit Court of Wood County, West Virginia, asking for a special receiver of the Casto Company of Parkersburg, West Virginia, and a similar action is contemplated to place the Casto Rubber Co. of Spencer, West Virginia, in receivership.

Darex Copolymer X-34

A new compounding ingredient, which is reported especially useful in quality shoe soles, top lifts, and both molded and mechanical rubber goods, has been developed by the Dewey & Almy Chemical Co., Cambridge 40, Mass. Designated as Darex Copolymer X-34, the material is a high styrene rubber resin. The company claims that five to twenty parts of the material in a highly loaded compound gives marked improvement in quality. For maximum effectiveness in low-loading, low-gravity stocks, twenty to forty parts are recommended to obtain high hardness with superior abrasion and flex-cracking resistance and low specific gravity.

Revise Lower Rubber Name

As announced last month, the name of the Lower Rubber Division of Chamberlain Engineering, Ltd., wholly-owned subsidiary of the U. S. Stoneware Corporation, was recently changed to the Columbia Rubber Co. It has since been determined that the name "Columbia" is already being used in the rubber industry, and accordingly activities of the former Lower Rubber Division will henceforth be conducted under the name of the Colonial Rubber Co. Operations are still being continued at Ravenna, Ohio, and no change in personnel or products has been made.

General Cable Reduces Prices

On April 23 the General Cable Corporation announced that it would grant wage increases of 11½ cents an hour to some 5,000 workers in its various plants. At the same time the company announced that it will reduce prices on its products from 6 to 12 percent in line with President Truman's request for lower prices. The company is also cancelling escalator clauses in its contracts, except for fluctuations in the price of copper and lead. The price reductions ranged from 6% in building wires and cables to 12% for magnet wires.

NAMES IN THE NEWS

H. J. YOUNG, assistant comptroller of the Goodyear Tire & Rubber Co., Akron, since 1936, has been named general auditor of the company.

R. F. SHAW, formerly chief chemist of the American Container Corp., has been appointed development chemist at the rubber laboratory of the Rock Island Arsenal, Rock Island, Ill.

D. K. MACLEAN, manager of the sugar mill machinery sales department of Farrel-Birmingham, Inc., Ansonia, Conn., has been appointed export manager for all lines of the company's machinery.

PAUL R. MCCAMPBELL, factory manager at the College Point, Long Island, N. Y., plant of the I. B. Kleinert Rubber Co., has been elected a vice-president of the company.

A. W. PHILLIPS, formerly assistant to Charles J. Jahant, vice-president of the General Tire & Rubber Co., Akron, has been named general manager of manufacturing for all the plants of the company, its subsidiaries, and affiliates.

WALTER T. JOHNSON, manager of the Chicago district sales office of the Columbia Chemical Division of the Pittsburgh Plate Glass Co. for the past three years, has been named New York district sales manager of the Division, with headquarters at 30 Rockerfeller Plaza, New York 20, N. Y.

A. M. BYERS, who has been in charge of magnesia sales for the Michigan Chemical Co., since 1943, and who previously served as vice-president of the General Magnesite & Magnesia Co. for twenty-six years, has been elected a vice-president of the Michigan organization.

J. S. KENNEDY, comptroller and CARL L. GYBERG, of the land department, of Godfrey L. Cabot, Inc., Boston, Mass., were honored recently at a dinner tendered in recognition of their long periods of service with the company.

C. L. AYERS, formerly associated with the Goodyear Tire & Rubber Co., at Akron as a compounder in the development department, recently joined the rubber section of the Flintkote Co., New York, as a technical sales representative.

DANIEL R. MOSER, who has been connected with the technical and sales departments of the Columbia Chemical Division of the Pittsburgh Plate Glass Co. since he was released from the Army with the rank of captain early in 1946, has been appointed Minneapolis, Minn., sales representative of the company.

ROBERT D. JUVE, who served as senior research chemist of the Goodyear Tire & Rubber Co. before being assigned by the company to special duties with the Technical Industrial Intelligence Committee of the Foreign Economic Administration for two years during the war, has been appointed synthetic rubber coordinator of the company.

CHARLES FREDERICKSON, attached to the St. Louis Plant of the General Cable Corp. since his recent discharge from the Service, has been transferred to the research laboratories of the company at Bayonne, N. J.

MORRIS COLLMER, formerly associated with the Acorn Insulated Wire Co. and more recently with the Alphaduct Products Co., is now with Cords Ltd., Inc., Newark, N. J., as production superintendent.

RICHARD P. HARRIS, formerly assistant to the factory manager of the Chance Vought Division of the United Aircraft Corp., has been appointed factory manager of the electroforming department of the U. S. Rubber Co. at Detroit, Mich.

DR. JOHN J. GREBE, director of the physical research laboratory of the Dow Chemical Co., Midland, Mich., recently received the John Wesley Hyatt award for outstanding achievement in the plastics industry during 1946. ROBERT R. DREISBACH, of the laboratory staff, received a silver medal from the Hyatt Award Committee.

R. F. MOODY and D. W. JOHNSON, both associated with the Compania Hulera "Euskadi" S. A., Mexico City, for the past several years, were recently appointed director general (president) and sub director (vice-president) of the company, respectively. The latter will be in charge of factory operations.

BRADLEY DEWEY, president of the Dewey and Almy Chemical Co., and former Rubber Director, has been named a member of a special Chemical Corps Advisory Committee, recently created at the request of Major General Alden H. Weitt, chief of the corps.

GEORGE P. F. SMITH, president of the Marbon Corp., Gary, Indiana, a subsidiary of the Borg-Warner Corp., has been elected a vice-president of the parent organization.

S. M. MARTIN, JR., who has been sales manager of the Thiokol Corp., Trenton, N. J., for the past several years, has been elected vice-president in charge of sales of that organization.

Zeilstra Named Chief Chemist

E. E. Zeilstra

E. E. Zeilstra, formerly chief rubber chemist of the wire division of John A. Roebling's Sons Co., Trenton, N. J., and most recently engaged in independent consulting work on rubber product and processing problems, has been named chief chemist of the Carr Manufacturing Corp., Bristol, R. I. Soon after he was graduated from Calvin College in 1934 with a B.Ch.E. degree, Mr. Zeilstra joined the Ford Motor Co. as technical supervisor of the inner tube and miscellaneous molded rubber goods department. When Ford sold its rubber producing machinery to Russia, Mr. Zeilstra became connected with Roebling. He remained with the latter organization until 1945, when he was appointed Midwestern technical representative of the Wilmington Chemical Corp.

C. A. "CHET" DWYER, active in the rubber industry for the past 29 years and a member of the staff of the Office of the Rubber Director during the war, has resigned from the B. F. Goodrich Co. to become a partner in the Enoch Manufacturing Co., Mt. Sterling, Kentucky.

DR. EUGENE M. MCCOLM associated with the U. S. Rubber Co. since 1927, has been appointed technical director of the company's Plantation Division. As research chemist of the plantations before the war, he played an important part in the development of latex processing methods.

L. M. SEIBERLING, sales manager of the Seiberling Rubber Co., has been elected a director of the company, succeeding his father, the late C. W. Seiberling.

SAMUEL R. RHOADS, who has been associated with the R. D. Wood Co., Philadelphia, Penna., since 1926, starting as a hydraulic machinery designer, has been appointed manager of the company's hydraulic machinery division.

TALK ON DIELECTRIC HEATING FEATURES LOS ANGELES MEETING

The May meeting of the Los Angeles Rubber Group, held at the Mayfair Hotel in Los Angeles on May 6, was highlighted by one of the most interesting and informative talks presented to the Technical Group Section. George F. Russell, president of the Northwest Syndicate, Inc., Tacoma, Wash., delivered an address on the latest applications of high frequency heating as applied to the rubber and wood industries. W. J. Thomas (Firestone) was in charge of the technical meeting.

Mr. Russell explained that two theories on the effect of the dielectric system on heating materials are upheld today. The uniform theory, upheld by a school of Eastern physicists and universities, holds to the belief that the dielectric high frequency method produces a uniform heat throughout the subjected material. The non-uniform theory, expounded by Mr. Russell and his Western colleagues, contends that when used for rubber and other materials it produces an uneven heat.

By a series of diagrams showing the curvature of the electric currents passing through an object set between opposite electrodes, Mr. Russell showed the reason for the higher degree of heat in the core of the object as compared to the outer edges. Experiments were conducted with blocks of wood in which photographs were taken of the bisected blocks, revealing a burnt core. The effect of dielectric high frequency applications on rubber is practically comparable to that of wood.

Describes Specific Experiments

In an effort to achieve a definite uniformity of heat, Mr. Russell experimented in the laboratories of the U. S. Rubber Co. It was definitely established that along with this system of heating applications, simultaneous external applications of heat on the object were needed, usually at the ratio of eight to one. Hot air was used as the method of external applications. Today the U. S. Rubber plant in Mishawaka, Indiana, is successfully using the process developed by Mr. Russell in the manufacture of foam sponge rubber.

Mr. Russell's present enterprise is engaged in the manufacture of the Mann-Russell Electronic Generators. A color movie was shown demonstrating its application to the lumber industry in the lamination of wood boards.

The after-dinner speaker of the evening was W. James Sears, Director of the CPA Rubber Division. Mr. Sears addressed the Group on "The Future of the Rubber program." He discussed government controls since VJ-Day, together with the policy for future rubber controls under the legislation recently passed by Congress, which extends authority for such controls until March 31, 1948.

Resinex Eases Black Shortage

C. J. Harwick, president of the Harwick Standard Chemical Co., Akron, has issued a timely suggestion on how many plants can help themselves over the critical carbon black shortage. "We have found," says Mr. Harwick, "that where a reduction of carbon black becomes necessary, Resinex can be used to advantage as an additive to maintain or, in some cases, actually increase the physical properties of the compound." It is not inferred that Resinex be used as a complete substitute for carbon black, but that its use will enable the compounder to maintain high physical properties with a reduced amount of carbon black in the compound. It is suggested that Resinex up to 10 parts will be found especially helpful in maintaining physical properties such as tensile, elongation and tear. In the problem of tread compounds the amount of carbon black eliminated may be replaced by Resinex on the basis of pound for pound. In the case of especially dry batches it may be necessary to add an amount of an appropriate liquid softener.

Hercules Opens New Plant

A new plant has been opened at Burlington, N. J., by the Hercules Powder Co. for the manufacture of chemicals for the adhesive, paint, varnish, lacquer and other industries. The first unit of the plant to be brought into production was the one for the manufacture of pentaerythritol resins for protective coatings. Subsequently, units for the manufacture of liquid resins, rosin esters, and hydroabietyl alcohol are expected to be in operation. It is anticipated that the plant will be in full production the latter part of this summer.

Rodic Absorbs Plastics Unit

The plant and processes of the plastics division of the Andover Kent Aviation Corp. have been merged with the facilities of the Rodic Rubber Corp., New Brunswick, N. J., a wholly-owned subsidiary. The company plans extensive development in both rubber and plastics, including several new consumer items. During the war, Andover Kent developed a low pressure plastic molding process now extensively used in the manufacture of electronic equipment and consumer products.

Softened Rubber Experiments

Dr. A. Sunderalingam, rubber technologist for the Government of Ceylon, has been experimenting with the preparation of chemically softened rubber for export to consuming countries. Use of such rubber is reported to eliminate pre-mastication, thus resulting in a saving of manufacturing cost. An investigation is now being made by the government to determine consumer requirements for softened rubber and what premium would be paid for it.

SYMPOSIUM ON RUBBER TESTING FEATURES 8 TECHNICAL PAPERS

According to the tentative program, eight technical papers will feature the Symposium on Rubber Testing which will be held by A.S.T.M. Committee D-11 in Atlantic City, N. J., on June 19, in connection with the 50th Annual Meeting of the parent society. The meeting itself will run from June 16 to 20. Headquarters are at the Chalfonte-Haddon Hall Hotel.

The Symposium will cover some of the work that has been done with regard to the physical and chemical methods of test, on both synthetic and natural rubber, by both government and industry during the period of the war when secrecy had to be maintained. Papers scheduled will stress the importance of standardization in the rubber industry, the work of Rubber Reserve, and the work of private industry in cooperation with government laboratories.

Of the eight papers scheduled, four will be presented at a morning session, starting at 9:30 A.M., and four at an afternoon session, starting at 2:00 P. M. Titles of the scheduled papers, together with their authors, follow herewith:

Morning Session

"The Significance of Voluntary Standards and Their Status in the Rubber Industry," by A. W. Carpenter (Goodrich).

"Functions of Rubber Reserve—Past, Present and Projected," by W. R. Hucks (Office of Rubber Reserve).

"Testing and Grading of Wild and Plantation Rubber," by Norman Bekkedahl (National Bureau of Standards).

"Development of Methods of Chemical Analysis of Synthetic Rubber," by Willard P. Tyler (Goodrich) and T. Higuchi (Akron University).

Afternoon Session

"Development and Standardization of Tests for Evaluating Processibility," by Rolla H. Taylor (National Bureau of Standards), M. Mooney (U. S. Rubber), and J. H. Fielding (Goodyear).

"Developments and Improvements in Methods of Stress-Strain Testing," by J. W. Schade (Government Evaluation Laboratories), and Frank L. Roth.

"Standardization of Testing and Inspection in Government Synthetic Rubber Plants," by Ludwig Meuser (U. S. Rubber), Robert D. Stiehler (National Bureau of Standards), and R. W. Hackett (Office of Rubber Reserve).

"The Use of Statistical Methods in Rubber Evaluation," by Marian M. Sandomire (Bureau of Ships).

JOSIAH B. RUTTER, formerly director of the general engineering department of the Merrimac Division of the Monsanto Chemical Co., Everett, Mass., has been named general manager of the division, succeeding Daniel S. Dinsmoor who has resigned to enter the chemical consulting profession.

NEWS IN BRIEF

Virginia Rubatex Division of Great American Industries, Inc., Bedford, Va., has applied to the Civilian Production Administration to build a $100,000 addition to its Bedford plant. The new addition is planned as the first step in a contemplated $400,000 expansion program.

Slipcovers made of Strex, the new stretchable cotton fabric developed by U. S. Rubber, will be distributed by the company in limited quantities this spring. The covers will be available with two-way stretch in various colors and styles to fit all types of chairs, davenports, and other upholstered furniture.

A guide book on truck decal advertising has been made available by the Meyercord Co., 5323 W. Lake St., Chicago 44, Ill. Entitled "Ads on Wheels," the book describes how and where to use decals to utilize the advertising space on trucks.

Approval has been granted to DuPont by the Civilian Production Administration for the construction of a new unit at Deepwater Point, N. J., to manufacture organic "Monastral" pigments.

A new tire especially designed to prevent side slippage of farm combines during hillside operations has been introduced by Goodrich. The tire has three high circumferential ribs, which are said to give adequate support to the carcass.

Fireproof drapery fabrics of asbestos and glass have been developed by U. S. Rubber for use in theatres, night clubs, restaurants, and similar places of public assembly. The new fabrics are said to be exceptionally light in weight and to have excellent draping qualities.

A tire almost eight feet high and weighing close to a ton is being produced by Goodyear to meet requirements of large construction machinery manufacturers.

Stretch-Tex Co., recently incorporated with capital stock of $150,000, will establish a plant at Huntsville, Ala., to manufacture elastic webbing for use in pajama belts, girdles, and such other articles.

Pantasote Co. has started full production of its new unsupported virgin vinyl Pantex and its virgin vinyl coated fabric Wynsote.

The Woonsocket plant of U. S. Rubber, which completed 604,000 man-hours without a lost-time accident during the last three months of 1946, was termed the safest factory in Rhode Island at a recent meeting of the Blackstone Valley Safety Council in Pawtucket, R. I.

A battery which is said to have a liquid reserve three times that of a conventional car storage battery has been introduced by the Seiberling Rubber Co. Known as the Ful-Fil Battery, it is reported to need refilling with water only three times a year in normal car service.

The Cellulose Products Department of the Hercules Powder Co. has opened an office in Cincinnati, Ohio, for the sale of cellulose chemicals to plastics, paint and lacquer manufacturers in the Cincinnati area.

To provide additional floor space for both factory and office, the Revolvator Co., manufacturer of material handling equipment, has constructed a new office building at its plant in North Bergen, N. J.

A booklet describing the company's new electric lift truck, called the Power Jacklift, has been made available by Lewis-Shepard Products, Inc., 316 Walnut St., Watertown 72, Mass.

A new line of garter belts and light weight girdles, including a maternity girdle styled with a rayon satin panel front and a satin Lastex back, has been introduced by the I. B. Kleinert Rubber Co.

A "vulcanized" starch, which is said to have many potential applications in industrial fields, has been introduced by National Products, Inc., 270 Madison Ave., New York 16, N. Y. Called Vulca Starch, the material is reported resistant to the swelling action of heat and chemicals.

Lord Manufacturing Co., Erie, Penna., has established a new sales division to serve the growing market for vibration control equipment in the household appliance field.

An eight-page bulletin, entitled "Vapor Saving Roofs," describing the company's expansion roof and improved floating roof of double-deck construction, has been made available by the Graver Tank & Mfg. Co., East Chicago, Indiana.

O'Sullivan Rubber Co., Winchester, Va., has received official approval for the construction of a $255,000 factory for the production of vinyl sheeting.

Simplex Wire & Cable Co., Cambridge 39, Mass., has made available its "Third Report to Industry on Simplex Synthetic Rubber Insulations." Physical test results of several compounds are given.

General Off-the-Road Tire

A new off-the-road tire designed to operate under extreme load conditions and to develop tremendous pulling power through sand, mud, rock, or gravel, has been introduced by the General Tire & Rubber Co., Akron. Designated as the LCM, which combines the first letter of the logging, construction, and mining work this tire is built to perform, it is said to contain 30% more rubber than has ever been used in any other General truck tire. Other features claimed for the tire by the company include deeper, heavier treads to protect against snags and cuts, reinforced heavy duty shock absorbing shoulders, self-cleaning cleats that converge for easier riding on the highway, and heavy dual and triple beads. The tires are being produced in seven sizes, ranging from 7.50 x 20 through 21.00 x 24.

Discusses Farm Tire Market

More than $100,000,000 worth of tractor tires and tubes, an all-time high, will be bought by America's farmers this year, according to a talk on "Rubber in Agriculture" made by J. A. Hoban, merchandise manager of the tire division of the B. F. Goodrich Co. at the 12th Annual Chemurgic Conference of Agriculture, Industry and Science, held in Oklahoma City, Okla., on March 26 to 29. Since the end of the war the dollar volume of tractor tire business has been "more than seven times what it was in 1941." Rubber tires on farm equipment can save a farmer 24 working days and 675 gallons of fuel yearly for each 150 acres worked according to exhaustive tests, Mr. Hoban stated. Other uses of rubber on the farm were also discussed by the speaker.

To Produce Mechanical Goods

Armada Rubber Manufacturing Co. was recently organized at Armada, Mich., to engage in the production of mechanical rubber goods for the automotive, radio, refrigerator, and similar industries. The company's plant contains approximately 12,000 square feet of floor space. Officers of the company include W. V. Pepenbring, president; L. A. Flickinger, vice-president; Thomas Steiner, Sr., treasurer; and Michael Stanis, secretary. Mr. Pepenbring is also general manager of the company, while Mr. Flickinger is sales manager.

ASME to Meet December 1 to 5

The sixty-eighth annual meeting of the American Society of Mechanical Engineers is scheduled to be held in Atlantic City, N. J., from December 1 to 5. Approximately 200 engineers, scientists, and industrialists are expected to take part in the program consisting of five days of continuous technical day and evening sessions. The theme for the 1947 meeting will be "The Engineer's Responsibility in Increasing National Productivity."

Named New York Representative

A. J. Baldwin

A. J. Baldwin, who served as production supervisor in 1941 at the first plant to produce vinyl films and sheetings for the Bakelite Corp., in Bound Brook, N. J., has been appointed New York representative of the Adamson United Co. He will make his headquarters at 441 Lexington Ave., New York 17, N. Y. Graduated from the University of Illinois with a B.S. degree in engineering, Mr. Baldwin began his plastics career at the National Carbon Co. where he went through a training program on the production and research problems of the newly discovered Vinylite resins. At the completion of the training program, he became production supervisor at the company's pilot plant, which produced vinyl sheets, films and sheeting and molding compounds. Transferred to the Bakelite Corp., in Bound Brook, N. J., as production supervisor in 1941, he was appointed head of the production engineering department two years later. In 1945 he was assigned to the project of designing the new Bakelite plant in Ottawa, Ill.

Java Plant Is Reopened

Goodyear Tire & Rubber Co. has announced that its plant at Buitenzorg, Java, has resumed production for the first time since the outbreak of the war. The company regained possession of the factory in January, 1947, after it was first in the hands of the Japanese and then the Indonesian revolutionaries. Production in May is expected to total 2,500 passenger car tires, 15,000 bicycle tires and tubes, and 500 retreaded tires. Before the war, the plant had a daily capacity of 900 tires and tubes and 8,000 bicycle tires and tubes. There were 1,000 persons employed then. Louis D. Hochberg, who fled from Buitenzorg just ahead of the Japanese at the start of the war and escaped capture, is manager of the plant.

Futures Trading Resumed

Crude rubber futures trading, in suspension throughout the war, was resumed on the New York Commodity Exchange on May 1. The initial trade was a contract unit of 10 long tons of ribbed smoked sheet for September delivery at 21.45c per pound. The seller was Jerome Lewine, head of H. Hentz & Co., and first president of Commodity Exchange, Inc., and the buyer was Joseph Klein of Faroll & Co. A total of 142 contracts were traded on the opening session, most of the activity being in the September and December positions. One lot was traded for March, 1948, delivery at 20.00c and two lots for May, 1948, delivery at 19.25c. Herbert E. Meyer, vice-president of the Exchange in charge of the rubber group, officially re-opened the rubber trading ring. On April 25 the Exchange announced that required original margin on trading in rubber futures has been set at $900 per contract. The minimum margin required on "hedge" purchases or sales is $600 per contract, and for "straddles," $200 per contract.

Issue Revised Specifications

A revised edition of the "Specifications for Government Synthetic Rubbers" has been issued by the Office of Rubber Reserve, Reconstruction Finance Corporation, Washington 25, D. C. The new edition contains a number of revisions approved on March 10 by the Committee on Specifications for Government Synthetic Rubbers. The revisions, with the exception of those pertaining to GR-M, were effective April 1, 1947. The GR-M revisions were effective as of May 1, 1947. Copies of the revised specifications may be secured direct from the Office of Rubber Reserve.

Additional Project Appointments

Four additional appointments to the staff of the Natural Rubber Research Project, which is being conducted at Salinas, Calif., for the Office of Naval Research by the Stanford Research Institute, have been announced by the Institute. Dr. Phillips M. Brooks has been appointed to the staff as a plant physiologist, while Dr. D. G. Catcheside, Dr. D. U. Gerstel and Mary E. Riner have joined the staff to study the genetics of the guayule plant.

Expanding Flexol TOF Production

A new plant for the production of triethylhexyl phosphate, a plasticizer marketed under the trade-name of Flexol TOF, is rapidly nearing completion, with initial operation expected in the immediate future, according to the Carbide & Carbon Chemicals Corp. Flexol TOF is said to be outstanding among plasticizers currently being marketed for uses requiring flame-resistance and low temperature flexibility.

Pryor Joins Advance Solvents

Henry P. Pryor

Henry P. Pryor, formerly chief chemist of the Rodic Rubber Co., has joined Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y., as head of technical service and sales to the rubber industry. A graduate of the University of Maine in 1937, Mr. Pryor was connected with the U. S. Rubber Co., at Naugatuck, Conn., and the R. T. Vanderbilt Co., at Norwalk, Conn., before joining Rodic Rubber.

Tire Production in February

Although average daily production was at a new record, total production of passenger car tires in February, 1947, because of the shorter month, declined 6.67% from the previous month, the figures being 6,429,156 and 6,888,566 units, respectively. Truck and bus casing production was 1,486,277 for the month, down 8.22% from January, but 22.22% above February, 1946. Production of passenger, truck and bus tubes dropped 10.07% from January, but was 61.96% above February of last year. The report, issued by the Rubber Manufacturers Association, indicated that tire manufacturers were approaching the peak demands of the hot weather driving period with inventories less than half of their pre-war level.

Union Asbestos Elects Officers

Union Asbestos & Rubber Co., 310 South Michigan Ave., Chicago, Ill., has announced the election of new officers. The new officers include J. H. Balch as executive vice-president and treasurer; R. E. Cryor, vice-president; and S. S. Steel, secretary. R. E. Cryor, A. A. Halle, Jr., Hugo Anderson, and Hugo Sonnenschein have been appointed members of the board of directors.

Kratz Rejoins General Latex

George D. Kratz

George D. Kratz, formerly vice-president in charge of research of the Norwalk Tire & Rubber Co., has been named sales representative of the General Latex & Chemical Corp. in the territory covering eastern Pennsylvania, southern New Jersey, and Delaware. Mr. Kratz will make his headquarters in the Pennsylvania Building, 42 South 15th St., Philadelphia, Penna. A graduate of Cornell University, Mr. Kratz was associated with General Latex as a sales representative for eight years just prior to the beginning of World War II. In 1942, he joined the U. S. Department of Agriculture in charge of a group working on the extraction of natural rubber latex from guayule, cryptostegia and kok-saghyz. Later in the war he was active in the GR-S latex program for the production department of the Office of Rubber Reserve. Mr. Kratz joined Norwalk Tire in 1944 in the position he held before rejoining General Latex.

To Open Australian Tire Unit

Firestone Tire & Rubber Co. has completed plans for the opening of a new tire manufacturing unit in Adelaide, South Australia. The plant will be the eleventh to be established by Firestone in foreign countries. Horace G. Miller, managing director of the Firestone New Zealand Co., handled negotiations with the Australian government and will supervise Firestone activities in both countries.

Develops Chemigum N-4NS

Goodyear Tire & Rubber Co., Akron, has developed a new non-staining, oil-resistant synthetic rubber, which has been designated as Chemigum N-4NS. The new rubber is said to have greater uniformity, low compression set, good heat aging, low solvent swell, high tensile strength, and to be applicable as a plasticizer for vinyl resins.

Electrically-Heated Ceilings

A new method of radiant heating employing electrically-heated ceilings is reported operating successfully in an experimental house at Knoxville, Tenn. The electric ceilings, developed by the U. S. Rubber Co. contain a heating element of conductive rubber sandwiched between two thin layers of plastic. The entire ceiling in each room becomes warm, producing enough heat to keep every nook and corner at a comfortable and uniform temperature. The panels developed for ceiling heat are four feet square. The method of installation is the same as for any type of panel. Electricity is conducted to the edge of the panels by copper wire but there is no wire in the heating areas. The ceilings are painted or papered in the conventional manner.

Polyvinyl Methyl Ether

The availability of polyvinyl methyl ether (PVM) in limited quantities for evaluation purposes has been announced by the Development Department, General Aniline & Film Corp., 247 Park Ave., New York 17, N. Y. Polyvinyl methyl ether has been used abroad under the name Igevin M as a heat sensitizer for synthetic rubber latices. The General Aniline laboratories have determined that it is also an effective heat sensitizer for natural rubber latex, as well as for some of the synthetic rubber latices commercially available in this country, including neoprene and the butadiene-acrylonitrile copolymers. Tests indicate that it is also a tackifier and modifier of adhesives. In physical form, PVM varies from sticky, balsam-like liquids to soft solids, depending upon conditions of polymerization. It is soluble in a wide variety of organic solvents and in cold water, and is precipitated from water solution by warming to 35°C. PVM is available as a 30% solution in water and as unmodified polymers. A special data bulletin on the material has been prepared and is available on request to the company.

Rubber Subsidiary Formed

Electric Storage Battery Co. has organized Stokes Molded Products, Inc., as a wholly-owned subsidiary to operate the plant formerly occupied by the Joseph Stokes Rubber Co. in Trenton, N. J. The Electric Storage concern acquired this plant from the Thermoid Co. in August, 1946. The business of the Joseph Stokes concern had been operated as a division of Electric Storage. The new company has an authorized capital of $3,000,000, consisting of 30,000 shares of $100 par value, and an outstanding capital of $1,900,000.

Named Director of Purchases

Elmer A. Stevens

Elmer A. Stevens, assistant to the director of purchases of the B. F. Goodrich Co., Akron, since 1942, has been named director of purchases by the company, succeeding Amos D. Moss, who will retire July 1. Well known in international rubber circles, Mr. Stevens joined Goodrich shortly after his graduation from the Sheffield Scientific School of Yale University as a chemical engineer in 1928. Assigned at first to the company's processing division, he entered the purchasing division in 1930 as a crude rubber buyer and in 1933 joined the Goodrich buying staff in Singapore. In 1940 he became managing director of the company's rubber buying subsidiary and stayed in Singapore until the last American boat carrying rubber left there in January, 1942, a few days before Japanese troops entered the city. On his return to Akron, Mr. Stevens was named assistant to the director of purchases.

Additional Navy Specification

An additional specification on rubber has been issued by the Bureau of Ships of the Navy Department since our last report. Copies of this specification may be secured by addressing a request to the Navy Department, Bureau of Supplies and Accounts, Washington 25, D. C. The specification follows:

Bureau of Ships 37G28 (Ships)—Goggles, Cover, Rubber Frame, February 1, 1947.

Sun Acquires Rubber Unit

Sun Chemical Corp. has announced the acquisition of Electro-Technical Products, Inc., manufacturer of bottle cap liners, rubber separator cloth, and electrical insulation. The company, which has plants in Nutley, N. J., and Los Angeles, Calif., will operate as a division of Sun Chemical, under the direction of Robert S. Robe as president.

NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those listed in our March, 1947, issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue.

X Number	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-364 GR-S	Firestone, Port Neches	2/28/47	Same as GR-S-65 except for lower conversion and 1.25 parts PBNA stabilization, glue acid coagulation, 50 Mooney.	Expect improved processing characteristics in this low water absorption type GR-S by changes in polymerization procedure. Available for evaluation only in quantities up to 75 pounds. Of particular interest to wire and cable industry.
X-365 GR-S	Firestone, Port Neches	2/28/47	Same as X-364 GR-S except for 60 Mooney.	Same as X-364. Slightly higher Mooney may show advantage in lower conversion polymer.
X-366 GR-S	Firestone, Lake Charles	2/20/47	GR-S-10AC with 1.25 parts PBNA 60 ± 5 Mooney, made by continuous polymerization.	Slight changes in polymerization not expected to change properties when compared with GR-S-10AC (formerly X-222).
X-369 GR-S	U. S. Rubber, Institute	3/6/47	GR-S masterbatch containing 55 parts HMF black per 100 parts GR-S (71 butadiene-29 styrene polymer made with fatty acid soap emulsification to an unpigmented polymer Mooney of 38). Stabilized with 1.5 parts BLE.	Channel black shortages require use of softer blacks. Premium price when available.
X-370 GR-S Latex	U. S. Rubber, Naugatuck	2/25/47	80/20 butadiene-styrene ratio with mixed rosin and fatty acid soap emulsification.	Low styrene high solids as an improved X-308 type for foamed sponge, etc. Specification Limits: Total Solids—58.0% min., Residual Styrene—0.25% max. (volatile unsaturates) on the total latex; pH—9.0 min., 10.5 max.; Latex Viscosity (Mooney Ewart)—160 cp max.; Polymer Viscosity—35.0 min., 55.0 max.
X-371 GR-S	Canadian Synthetic, Sarnia, Ontario		GR-S-60 stabilized with 1.25 parts Stalite. Relatively non-staining cross-linked polymer.	The Polymer Corp., Ltd., Sarnia, Ontario, Canada, should be contacted in regard to evaluation samples. This polymer not made in United States at present time.
X-372 GR-S	U. S. Rubber, Institute	3/10/47	X-181 GR-S crumb heat softened in plant dryer to 60 ± 15 Mooney.	Heat softening of this low modified GR-S-85 type polymer to lower Mooney would be expected to result in improved processing compared to X-181. Improved physical properties may result, particularly in tread wear and rebound.
X-373 GR-S	National Synthetic, Louisville	3/26/47	60/40 butadiene-styrene ratio polymer having rosin acid soap emulsification with 1.25 parts Stalite and 55 ± 5 Mooney.	Slightly higher styrene with relatively non-staining characteristics. Similar to X-274 (GR-S-10 type) except for higher styrene content.
X-374 GR-S	U. S. Rubber, Institute	3/20/47	GR-S latex masterbatch containing 80 parts Gastex per 100 parts GR-S (71 butadiene-29 styrene polymer made with fatty acid soap emulsification to an unpigmented polymer Mooney of 38). Stabilized with 1.5 parts BLE.	Channel black shortages require use of softer blacks. Premium price when available.
X-375 GR-S	U. S. Rubber, Naugatuck	3/20/47	GR-S-85 heat softened to 60 ± 15 Mooney in plant dryer.	See X-372.
X-376 GR-S	General, Baytown	3/10/47	Same as GR-S-Black-1 except that Mooney viscosity of contained polymer is 50 ± 5.	There are some indications that higher Mooney polymers show better tread wear and rebound. Masterbatched to obtain better dispersion of pigment and facilitate processing. Prepared for Tire Test Projects 114 & 118.
X-377 GR-S	General, Baytown	3/10/47	Same as GR-S-Black-1 except that Mooney viscosity of contained polymer is 70 ± 5.	See X-376.
X-378 GR-S	U. S. Rubber, Institute	3/17/47	GR-S masterbatch containing 55 parts SRF black per 100 parts of GR-S-10 stabilized with 1.5 parts UGUL.	Non-staining type masterbatch. Premium price when available.
X-381 GR-S Latex	U. S. Rubber, Naugatuck	3/19/47	Similar to GR-S Type III Latex except for adjustment to give a Mooney viscosity of 25 to 40 on the contained polymer.	Low Mooney latex which might be of interest for adhesives. Specification Limits: Solids content, 37.0 to 39.0%; pH, 9.5 to 11.5; Residual styrene, 0.5% max. on the latex; Mooney viscosity of the contained polymer, 25 to 40.
X-382 GR-S	Goodrich, Port Neches	3/26/47	X-368 GR-S (GR-S-10 type polymer made by continuous polymerization). Stabilized with 1.25 parts Stalite. Mooney is 50 to 58.	Slight reduction in stabilizer might reflect slightly better non-staining characteristics. Might expect other properties similar to X-274.

Monsanto Rebuilding Styrene Plant

Clearing of wreckage and plans for rebuilding of its styrene plant at Texas City, Texas, were announced by the Monsanto Chemical Co. on April 23. The plant facilities were completely destroyed in the Texas City blast when a shipload of ammonium nitrate exploded in the bay near the styrene plant. Subject to further examination, it is believed that parts of the plant may be back in production in six months, although it will take about 18 months to rebuild the entire plant. The plant, which had a capacity of 60,000 tons of styrene per year, approximately 25% of the capacity of the country, was operated by Monsanto for the government during the war. Monsanto purchased the plant from the government for approximately $10,000,000 last year. Loss of the Texas City facilities is not expected to interfere with the production of synthetic rubber because of the sharp cut-backs in such production within recent months and additional cut-backs anticipated in the next several months. Styrene facilities at Institute, West Virginia, are expected to be fully restored in the near future. Bids of the Carbide & Carbon Chemicals Corp. for purchase of the styrene and butadiene plants at Institute have already been approved by the regional office of the War Assets Administration and consummation of sale is expected momentarily.

Develops Neoprene Type S

A new chloroprene polymer which is reported particularly valuable for crepe soling has been developed by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. Designated as Neoprene Type S, the elastomer is said to make possible the manufacture of crepe soles which are uniform in quality and which do not have the shortcomings of natural rubber. Claimed to be uniformly tough and not to break down during milling and calendering, it can be attached to shoes by cementing or stitching and, when firmly attached, resists spreading. Colored pigments may be added to Neoprene Type S to produce soles in any desired hue, and low cost fillers may be added as extenders. Crepe soles made of the elastomer are said to be relatively unaffected by gasoline and oil, and to resist the deteriorating action of sunlight and heat. Available in the form of light amber colored rods, it has a specific gravity of 1.23.

A.C.S. Rejects A.I.C. Merger

The Council of the American Chemical Society, meeting during the 111th annual convention in Atlantic City, N. J., from April 14 to 18, rejected a proposal to merge with the American Institute of Chemists. However, the Council voted for the appointment of a committee looking towards the creation of a professional division as a new unit of the Society.

FINANCIAL NEWS

Pantasote Co.

For 1946: Net profit of $504,852, which is equal to $1.31 a share on the 385,138 common shares outstanding, and which compares with $81,856, or 21c a share on 375,000 shares, for the previous year. Net sales amounted to $4,316,529, as compared with $4,093,495 for 1945. Net working capital as of December 31, 1946, totaled $831,200 against $633,378 at the end of the previous year.

Thermoid Company

For 1946: Net income of $853,197, which is equal to $1.19 a common share, and which compares with $475,194, or 63c a share for the previous year. In addition to 1946 net income, a profit of $755,333 was realized on sale of plant and equipment of subsidiaries which, after a $195,000 reserve for taxes, left a net of $560,333 that was carried directly to surplus.

Approve Increase of Stock

Stockholders of the O'Sullivan Rubber Co. have voted to increase the company's authorized preferred stock from 37,500 shares to 150,000 shares and the common stock from 300,000 shares to 600,000 shares. The increase was authorized in order to provide funds for the expansion of the company's plastics division.

General Cable Corp.

First Quarter: Net income of $1,628,298, after deducting $1,040,000 for taxes, which compares with a net loss of $2,231,464 for the corresponding period of the previous year when operations were adversely affected by work stoppages at five of the company's plants.

Denman Tire & Rubber Co.

For 1946: Net income of $316,140, which is equal to $1.56 a common share, and which compares with $163,118, or 84c a share, for the preceding year. Net sales amounted to $4,267,188 which compares with $3,105,611 for 1945.

Cooper Tire & Rubber Co.

For 1946: Net profit equal to $3.83 a share on 156,721 shares of common stock outstanding. Gross sales amounted to $12,583,668, which is a new record for the company.

Anaconda Wire & Cable Co.

For 1946: Net income of $3,094,161, which is equal to $7.33 a share, and which compares with $646,324, or $1.53 a share, for the previous year.

Establish American Rubber Corp.

Last January the factory and warehouse of the Florida Rubber Corp., at Miami, Florida, was totally consumed by fire. The company is now in preparation of moving its salvaged machinery and replacing the equipment which was beyond salvage to a new site in Huntsville, Alabama. Acquired from the U. S. Army Engineers, the new site comprises 55 acres in area, includes five principal and two small buildings, all connected with covered concrete ramps, and the total area of buildings and covered loading platforms is approximately 120,000 square feet. The property is adjacent to the Tennessee River and is about 10 miles from the city of Huntsville. The new operating company will be known as the American Rubber Corporation, with George Brumlik as president, Thomas J. Brumlik as vice-president, and Warren G. Brumlik as secretary-treasurer. George Brumlik will function as sales manager, Thomas on purchasing and procurement, and Warren as factory manager. In addition, Harold R. Moon will act as chief chemist, Charles H. Painter as production superintendent, and Colin W. McLean as maintenance supervisor. Manufacturing operations are expected to begin by July and principal products will be rubber floor tiling, shoe soling, sponge rubber, and a variety of specialty molded products.

Establish Manufacturing Committee

Because of the recent legislation respecting allocation and end-use specifications, and in anticipation of Congress giving early consideration to an American-made rubber program, the Rubber Manufacturers Association has established a Rubber Manufacturing Industry Committee. The committee, which will cooperate with the recently-established Rubber Industry Advisory Committee of the Army-Navy Munitions Board, comprises the following members: John L. Collyer (Goodrich), H. S. Firestone, Jr. (Firestone), A. L. Freedlander (Dayton Rubber), A. A. Garthwaite (Lee Tire), P. W. Litchfield (Goodyear), William O'Neil (General Tire), Harry E. Smith (Manhattan Rubber), and Herbert E. Smith (U. S. Rubber). All of the members, with the exception of Mr. Litchfield and Mr. Garthwaite, are also members of the Army-Navy Munitions Board's advisory committee.

Tennessee Plant For Sale

A partially built war plant in Nashville, Tenn., which was designed for use by the Goodyear Tire & Rubber Co. for the production of rubber and textile products, has been offered for sale by the War Assets Administration. The plant, which is 16% complete, is said to be adaptable for the production of automobile parts, iron and steel products, transportation equipment, or rubber or textile products.

Reduce Consulting Committees

The number of consulting technical committees which advise the Rubber Division of the Civilian Production Administration (now the Rubber Division, Office of Materials Distribution, Department of Commerce) has been reduced from 23 to 11. The reduction was possible because various branches of the rubber manufacturing industry have advanced so far in solving their postwar manufacturing problems that the respective committees are no longer needed. In some cases committees have been merged and in others they have been made sub-committees. Names of the remaining committees, together with the names of their chairmen, follow: *Athletic and Rubber Toy,* E. C. Brueggeman, Seiberling Latex Products Co., Barberton, Ohio, and C. D. Carlson, Pennsylvania Rubber Co., Jeannette, Penna., co-chairmen; *Chemically Blown Sponge,* J. F. McWhorter, Ohio Rubber Co., Willoughby, Ohio; *Coated and Combined Fabrics,* Harold Nelson, U. S. Rubber Co., Mishawaka, Indiana; *Rubber Footwear,* Chas. H. Baker, Goodyear Footwear Corp., Providence, R. I.; *Hard Rubber,* D. E. Jones, American Hard Rubber Co., Butler, N. J.; *Foamed Latex Products,* J. J. Allen, Firestone Rubber & Latex Products Co., Fall River, Mass.; *Mechanical Rubber Goods,* W. L. Smith, B. F. Goodrich Co., Akron, Ohio; *Medical and Surgical Rubber Goods,* A. R. Gow, Seamless Rubber Co., New Haven, Conn.; *Sole and Heel,* W. E. Kavenagh, Goodyear Tire & Rubber Co., Windsor, Vermont; *Wire and Cable,* R. A. Schatzel, Rome Cable Corp., Rome, N. Y.; *Tire and Tube,* H. E. Elden, Dunlop Tire & Rubber Corp., Buffalo, N. Y. A complete list of all committee members will appear in an early issue.

O'Sullivan Elects Officers

O'Sullivan Rubber Co., Winchester, Va., has announced the election of five executive officers. James N. Mason, formerly vice-president and factory manager of the company, has been elected executive vice-president, while A. C. Halvosa, formerly secretary-treasurer, W. S. Winterson, and R. H. Folger have been elected vice-presidents of the company. P. L. Hockman, formerly assistant secretary and assistant treasurer, has been elected secretary-treasurer. He will also continue as comptroller.

New Executive Appointments

Several new executive appointments have been announced by the American Hard Rubber Co., 11 Mercer St., New York 13, N. Y. Leslie Weeden, factory superintendent at the company's Akron plant, has been named vice-president in charge of manufacturing by the company, while Allen H. Ottman has been appointed vice-president and controller, and Roland Reppert has been named vice-president in charge of sales.

Quick-Clip Fastening Method

A new and rapid method for fastening rubber to metal, which extends the scope of such applications, was recently developed by the Ohio Rubber Co., Willoughby, Ohio. Called the Orco Quick-Clip Fastening Method, it calls for a molded rubber part, a metal plate, and

a metal clip. As indicated in the accompanying illustration, an integral stem is part and parcel of the molded rubber article. The stem goes through a hole drilled in the metal, and a metal clip is slipped over the rubber stem. No tools are needed for the operation. The number and position of stems on the molded rubber part are of course dependent on the size, shape and other factors relating to the specific rubber and metal parts to be fastened. Likewise, the design, size and shape of the metal clip is subject to numerous variations to meet specific conditions. Under certain conditions, the method may also be applied to extruded rubber parts.

Rubber Consumption in February

Consumption of rubber in February, 1947, amounted to 94,010 long tons, a decrease of 9.69% from the 104,092 tons consumed in January, according to the Rubber Manufacturers Association. Since daily average consumption showed no dip, the decline was attributed to the shorter month. Of the total consumed in February, 40,906 tons were natural rubber and 53,104 were synthetic. Consumption for the first two months of 1947 was running at the rate of 1,200,000 tons a year, or over double the pre-war average annual consumption from 1930 to 1940. Pre-war peak production was reached in 1940 when the industry consumed 648,000 tons, while the 1,039,000 tons used in 1946 represented an all-time record. A total of 25,620 tons of reclaimed rubber was consumed in February, which is a decrease of 7.56% from the 27,715 tons consumed during the previous month.

Carbon Black Plants for Sale

Six wartime channel type carbon black plants which cost the Government $20,282,000 have been offered for sale or lease by the War Assets Administration. The six plants have a combined annual capacity of 126,000,000 pounds, which is about 20% of the nation's industrial needs. The wartime operators and location of the plants are as follows: Cabot Carbon Co., Guymon, Okla.; Charles Eneu Johnson & Co., Monument, N. M.; Panhandle Carbon Co., Eunice, N. M.; Columbian Carbon Co., Seagraves, Tex.; United Carbon Co., Odessa, Tex.; and Continental Carbon Co., Sunray, Tex.

Army-Navy Advisory Committee

Thirty-one leaders of the American rubber industry comprise the newly-established Rubber Industry Advisory Committee of the Army-Navy Munitions Board. The committee was organized to aid in the development of industrial mobilization plans which will provide for an adequate supply of rubber in the event of a national emergency. It will also advise the Army-Navy Munitions Board in the many and different problems involved in the strategic stockpiling of natural rubber under the stockpiling law enacted by the 79th Congress last July. Members of the committee are: W. T. Baird (Baird Rubber & Trading), Charles H. Baker (Goodyear Footwear), E. R. Bridgwater (DuPont), George Bunn (Phillips Petroleum), Earl Bunting (O'Sullivan Rubber), John L. Collyer (Goodrich), George Davidson (Standard Oil, Calif.), Willard H. Dow (Dow Chemical), H. S. Firestone, Jr. (Firestone), Jacobus F. Frank, A. L. Freedlander (Dayton Rubber), A. L. Grant (C. T. Wilson), F. D. Henderickson (American Hard Rubber), W. H. Huffman (Neches Butane Products), R. G. Landers (Landers Corp.), F. Thatcher Lane (Seamless Rubber), T. E. Martin (Lion Oil Refining), Everett Morss (Simplex Wire), J. H. Nesbit (U. S. Rubber Reclaiming), William O'Neil (General Tire), D. A. Paterson (H. A. Astlett), M. J. Rathbone (Standard Oil, N. J.), Thomas Robins, Jr. (Hewitt Rubber), G. L. Scheinler (Badenhop), J. P. Seiberling (Seiberling Rubber), Herbert E. Smith (U. S. Rubber), Harry E. Smith (Manhattan Rubber), O. G. Vinnedge (Dryden Rubber), J. A. Walsh (Armstrong Rubber), R. S. Wilson (Goodyear Tire), C. W. Yelm (Gates Rubber).

Changes at Gilmer Division

Several important organizational changes in the L. H. Gilmer Co. Division of the U. S. Rubber Co., Philadelphia, were recently announced. L. K. Youse, who has been technical superintendent since 1943, has been named assistant manager, while Harry A. Bourne, who joined the plant in June, 1944, as works manager has assumed the responsibilities of factory manager. Joseph L. Smith, long associated with U. S. Rubber's mechanical goods division, has been appointed control manager at the plant.

Creates New Research Laboratory

A new research laboratory designed to assist manufacturers in solving their special cementing problems has been created by the Adhesive Products Corp., 1660 Boone Ave., New York 60, N. Y. Offered free to manufacturers, this new laboratory research service is supervised by chemists with broad industrial backgrounds. At their disposal is modern testing equipment which includes a Scott testing machine, Fadeometer, Oxygen Bomb, and various precision viscosity measuring machines.

LOS ANGELES NEWS

Manufacturing operations at the new plant of American Anode, Inc., in East Los Angeles were officially started on April 23. The unit, construction of which began in October, 1946, and the first of its kind west of the Mississippi River, will have an annual capacity of 4,000,000 pounds of synthetic and crude rubber latices in raw and compounded forms. R. A. Lees, formerly connected with the American Anode plant at Akron, is plant manager.

Frank Shew, well known in Pacific Coast rubber circles, and who recently returned from an extensive trip through South America, is now associated with the MacClatchie Manufacturing Co., at Compton, Calif.

Recent visitors in the Los Angeles area included Carl Shaffer (Xylos Rubber), Dave Parrish (Goodrich Chemical), and George Wolloch (Schulman).

Various prizes were awarded at the recent Spring Golf Tournament held by the Los Angeles Rubber Group. The following were included: *Lowest Score,* Al Pickard (Braun Corp.); *Longest Drive, First Hole,* E. Hensal (Goodrich); *Closest to Pin,* Willys Blount (Kirkhill); *Longest Putt Sunk,* A. J. Hawkins, Jr. (DuPont).

The Koylon Foam Division of the U. S. Rubber Co. has announced the appointment of Reliatex, Inc., 506 South Los Angeles Street, as exclusive wholesale distributors for Koylon foam rubber in the Los Angeles area. The company will supply the foam rubber in sheet form to furniture manufacturers, interior decorators, the aircraft industry, boat works, and other processors.

Further expansion of manufacturing facilities for mechanical and molded goods at its local factory has been announced by the Goodyear Tire & Rubber Co. According to D. W. Sanford, vice-president, equipment is to be installed for production of automobile floor mats, and several thousand small-type tires for toys, lawn-mowers and industrial vehicles will be produced daily. Ben Lee Mattingly, until recently associated with the Goodyear plant at St. Mary's, Ohio, has been named manager of molded goods sales, Los Angeles.

Purchase of the Olympic Rubber Co., Inc., Lynwood, Calif., by C. A. Meader and Frank C. Merrell has been announced. Mr. Meader was formerly associated with the California Research Corporation, and worked in close collaboration with the synthetic rubber industry during the war, while Mr. Merrell has been engaged in the manufacture and sale of tire repairing materials for many years. For the past few years, Olympic Rubber has been manufacturing tire shop equipment, including molds, but under the new owners plans call for the construction of a new plant for the manufacture of camelback and tire repair materials. Shop equipment will continue to be made.

A joint meeting of the Los Angeles Rubber Group and the Los Angeles Section of the American Society for Testing Materials was held at the Rodger Young Hall in Los Angeles on March 18. Raymond B. Stringfield (Fullerton Mfg.) introduced several officers of the A.S.T.M. who were present, as well as members of the rubber group. Arthur W. Carpenter (Goodrich), president of the A.S.T.M., gave a fine talk on "Progress in Rubber," covering the historical and scientific background which preceded the development of GR-S. He also discussed the functions of A.S.T.M. Committee D-11 on Rubber and Rubber-Like Materials.

U. S. Rubber Co. has established tire testing headquarters on the Pacific Coast, utilizing various dry lakes for the purpose. On these lakes, according to D. W. Walsh, Pacific Coast Manager of the company's Tire Division, with temperatures sometimes ranging to 120 degrees, the tires, mounted on cars, are run up to 1,000 miles per day at 90 miles per hour and more. This method of testing is a recent development, made possible by the use of a plane wing section mounted on the side of the test car. On the circular tracks, the plane wing creates an inward thrust to counterbalance the centrifugal pull created on turns that the cars take at 90 m.p.h. The weight of the car is thus kept in perfect balance as in normal straightaway driving.

OBITUARIES

John Cunningham

John Cunningham, managing director of Phillips' Rubber Soles, Ltd., London, England, died in Dublin while on a business visit on March 22. Death was attributed to a heart attack. He was 54 years of age. Mr. Cunningham, well known in rubber circles on the Continent as well as in this country, joined the Phillips organization as secretary in 1919 after serving for four years in World War I. After three years as joint managing director of the company, he was named managing director in 1932. Mr. Cunningham was chairman of the British Sole and Heel Manufacturers' Association, a member of the executive committee and council of the Federation of British Rubber Manufacturers' Associations, and a member of the Institution of the Rubber Industry. A widow and two sons survive.

Aaron G. Ladrach

Aaron G. Ladrach, veteran Akron gauge manufacturer and designer, died suddenly of a cerebral hemorrhage at his home in Portage Lakes, Ohio, on April 8. He was 62 years old. Born at Regersville, Ohio, in 1885, Mr. Ladrach had been engaged in the production of precision gauges for approximately twenty years. After working in the experimental laboratory of the Seiberling Rubber Co., he founded and became president of the Magnetic Gauge Co. and also headed the A. G. Ladrach Co. Nationally known as an inventor, he designed gauges that could detect bumps in materials ranging from cellophane to strip metal. He was a member of the Evangelical Reformed Church in Regersville. A widow survives.

Edgar H. Gorsuch

Edgar H. Gorsuch, factory manager of the Corduroy Rubber Co., died at his home in Grand Rapids, Mich., on April 12 following a heart attack. He was 56 years old. Born in Barberton, Ohio, Mr. Gorsuch was connected with the Firestone Tire & Rubber Co. before joining Corduroy Rubber in 1925 as chief chemist and assistant factory manager. He was a member of the Columbia Chapter of the Masonic Order, the board of deacons of the East Congregational Church in Grand Rapids, and was a past president of the Greater Grand Rapids Safety Council. A widow and daughter survive.

Charles R. Palmer

Charles R. Palmer, president, treasurer, and general manager of Palmer Thermometers, Inc., died in a hospital in Cincinnati, Ohio, on April 30 following a heart attack. He was 66 years old. Mr. Palmer was also president of the Palmer Thermometer Co., Ltd., Toronto, Ontario.

CANADIAN NEWS

Gross sales of products manufactured by the Canadian rubber industry in 1945 amounted to $181,413,000 as compared with $169,511,000 in the preceding year, according to figures released by the Dominion Bureau of Statistics.

Of the three main classes of products manufactured, rubber tires and tubes accounted for $85,239,780 or almost 47 per cent of the total for 1945, rubber footwear for $24,645,897 or over 13 per cent, and other rubber goods for the balance of $71,527,549 or almost 40 per cent. Compared with the preceding year, output of rubber tires and tubes increased almost 21 per cent, rubber footwear over 39 per cent, and other rubber goods decreased by 12 per cent.

A notable feature in 1945 was the increase in the output of balloon tires for passenger cars which rose from 855,224 in 1944 to 1,303,151 in 1945. Another feature was the resumption of large scale exports of rubber footwear. The production of tires of all kinds increased by 809,671 and tubes by 1,071,461 with increases in values of $12,463,912 and $2,254,077 respectively.

Rubber footwear also increased from 14,038,409 pairs in 1944 to 18,019,431 pairs in 1945 with an increase in value from $17,717,137 to $24,645,897.

Canadian motorists' hopes that the end of rubber control in Canada on April 1st would mean a speedy return of natural rubber tires were dashed when it was learned that Canadian rubber manufacturers have agreed to continue a voluntary form of allocation control for an indefinite period. The control will be administered through the Rubber Association of Canada.

This action means there is no prospect of an immediate change in the natural rubber content of automobile tires or other goods. The best which manufacturers promise is a gradual increase in percentage of crude as the supply situation eases.

At present, Canadian manufacturers are averaging about 40% natural rubber to 60% synthetic in total production. By the end of the year, they hope to increase the average of natural to 55% over all, according to Reconstruction and Supply Department at Ottawa. How soon this target can be reached depends on availability of crude rubber. If supplies increase more rapidly than now expected, this percentage might be increased by year's end.

Although government control of the use of crude rubber in Canada was removed on April 1st, there has been no change in the natural rubber content of tires since that made last December, rubber manufacturers have indicated. At that time, Ottawa permitted use of crude in ordinary 4-ply passenger tires to jump from 13% to 23% of content. Six-ply tires in the popular size could use 33%. Larger size passenger tires, since December have been using as much as two-thirds crude. Large bus and truck tires are made almost entirely of crude rubber.

A minimum 1947 wage increase objective of 20 cents an hour for workers in the rubber industry has been set by the Canadian district policy committee of the United Rubber Workers (CCL-CIO). The increase will be sought through a clause in all present contracts in the industry which permit the union to reopen the wage question "if warranted by the general economic situation in Canada."

Representing 12,000 rubber workers in 20 locals from Ontario and Quebec rubber plants, the policy committee based its demands on three factors: (1) Increased living costs since existing wage scales were negotiated last October providing for a 13-cents-an-hour wage increase; (2) Decreased take-home pay since October due to reduced hours, no overtime and slashed job rates; and (3) Increased per man productivity and a union claim of record profits in the rubber industry in 1947.

Gutta Percha and Rubber, Limited, Toronto, has announced the election of J. Ross Belton as president and general manager. Mr. Belton has been serving as general manager of the company and was elected a director last July. At the same time it was announced that C. S. Band has been elected as chairman of the board. F. A. Warren, who resigned as president, continues with the company as treasurer and a director.

A tour of the Polymer plant will be the initial item on the itinerary of Viscount Alexander of Tunis and of Errigal, Governor General of Canada, when he visits Sarnia on May 28. Announcement of the viceregal visit came recently when it was learned from official sources that Sarnia would be among several Western Ontario cities to be visited by His Excellency in the last few days in May.

According to tentative plans, Viscount Alexander will arrive in Sarnia aboard a special train on the evening of May 27. The following morning he and his party will drive to Polymer where they will be greeted by officers of the company and conducted on a brief inspection tour of the plant.

J. Ross Belton
heads Gutta Percha & Rubber, Ltd.

Announcement has been made by James I. Simpson, President and General Manager, Dunlop Tire and Rubber Goods Co., Ltd., of the following executive appointments: W. R. Walton, Jr., formerly Works Manager, becomes Assistant General Manager; G. F. Plummer, formerly Accountant, becomes Assistant Secretary-Treasurer; W. H. Bartlett, formerly Assistant Works Manager, becomes Works Manager; L. E. Levey, formerly Sales Manager, Tire Division, becomes General Sales Manager.

Several appointments have been announced in recent weeks by the Goodyear Tire & Rubber Co. of Canada, Ltd. S. G. Nicholls, who has been serving as Deputy Rubber Controller at Ottawa, has returned to full time duty with the company and has been named Manager of the Mechanical Rubber Goods Department, while G. V. Davis, associated with the company since 1919, has been named assistant manager. G. L. McCrea, for many years manager of the department, will act as a special consultant. Fred G. Wilmot, with the company for more than 20 years, has been appointed manager of tire sales, and Jack M. Templeton manager of the service department.

Construction of the large addition to its plant at Welland, Ontario, recently announced by the Joseph Stokes Rubber Co., Ltd., has been postponed, according to Lloyd R. Leaver, vice-president and managing director. The major part of the addition was to have been used for the manufacture of Thermoid automotive products, primarily for the export market. Further addition to the plant will however be undertaken later this year, and a larger research laboratory is also planned.

NEW RUBBER GOODS

Inflatable Rubber Sailboat

A new type of rubber sailboat which can be used for hunting, fishing, or sport, has been placed on the market by the Raycarr Sales Co., 522 Fifth Ave., New

York 9, N. Y. Weighing ten pounds, the boat is five and a half feet long and three feet wide when inflated. The complete unit is furnished with a red sail, five-foot telescopic mast, rigging, pump, paddle, and sea anchor.

Lord Multiplane Mounting

Lord Manufacturing Co., Erie, Penna., has introduced a new mounting which is said to isolate vibration regardless of the direction of the disturbing forces. Known as the Multiplane Mounting, it utilizes the principal of rubber-in-shear to secure equal softness in all planes.

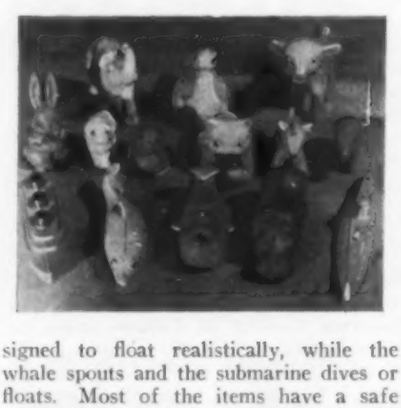
The company recommends the new mounting especially for protection of equipment exposed to vibration of intermediate nature, and claims that successful applications have already been made on instrument panels, electronic equipment, fans, blowers, air conditioners, and many other types of equipment. The mounting is said to provide the same protection formerly obtained by double-mounting methods.

Double Eagle Airwheel Tire

A new premium bicycle tire designed to give greater wear and riding comfort has been placed on the market by the Goodyear Tire & Rubber Co., Akron. Known as the Double Eagle Airwheel, the tire is the company's post-war version of its premium product by the same name manufactured prior to World War II. Constructed with two plies of patented supertwist cord, the same as is used in the company's DeLuxe automobile tire, the carcass of the new tire is said to be 100% stronger than the conventional bicycle casing. The company claims that the two special plies provide an overlap feature equivalent to an extra ply directly under the tread where the wear is greatest. Other special features of the new tire include a thicker, heavier tread with a deeper non-skid design which is said to insure maximum protection against cuts, bruises, and blowouts resulting from fast stops and starts and higher rolling speeds.

Kaysam Molded Latex Toys

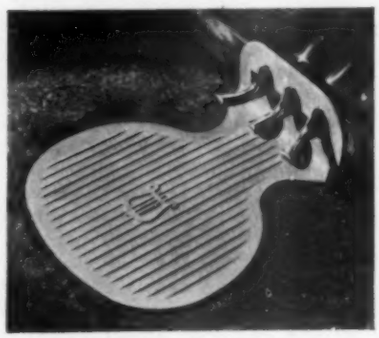
Molded Latex Products, Inc., 27 Kentucky Ave., Paterson 3, N. J., has introduced a complete line of Kaysam Molded Latex toys. Made of neoprene latex in three pastel shades—blue, yellow and pink—they have been designed as action toys, incorporating maximum play value. The floating toys, including ducks, fish, liners, etc., have been de-



signed to float realistically, while the whale spouts and the submarine dives or floats. Most of the items have a safe squeaker which can be sounded by the squeeze of an infant's hand. Because they are made of neoprene, the toys are practically indestructible and can be sterilized in boiling water without harm to the fast color or shape of the toy. Each item is individually wrapped in cellophane when shipped. The even wall thickness obtained with the Kaysam process gives these toys the proper balance so that they float in a life-like position on water.

Protecto Piano Carpet Pad

A new all-rubber piano carpet pad, designed to save carpets and rugs from scuffing, has recently been introduced. Made of Hycar, it fits over the pedals of any piano and acts as a shield against toes that scuff and heels that dig and tear. Since it fits snugly over the pedals,



it also protects the pedal board of the piano from scratches. Molded in one piece, the pad, called the Protecto Piano Carpet Pad, features ribbed surfaces on top and bottom to prevent sliding of the pad itself as well as of feet rested on the pad. A lyrical design is utilized on the top surface. Available in either walnut or mahogany, the pad is manufactured by the Wooster Rubber Co. It is sold by Robert Marcy Associates, 110 West 40th St., New York 18, N. Y., east of the Rockies, and by Continental Distributors, Inc., 305 So. Vermont Ave., Los Angeles 5, Calif., west of the Rockies.

Reliable Industrial Wheels

A complete line of industrial wheels for all possible uses is currently being featured by the Wisconsin Rubber Products Co., 743 North 4th St., Milwaukee 3, Wisc. The line includes composition rubber wheels molded in one piece, steel disc wheels with solid rubber tires and equipped with anti-friction ball or roller

bearings, and aluminum wheels with semi-pneumatic or solid cushion tires. The composition rubber wheels are made of a special oil-resistant rubber with "molded in" brass bushings which have a diamond serrated outer surface to prevent turning or slippage under severe operating conditions. These wheels are especially designed for quiet operation and will not mar or mark fine floor surfaces. The entire line is marketed under the name "Reliable." A composition rubber wheel is illustrated.

NEW EQUIPMENT

Collapsible V-Belt Curing Mold

Collapsible V-belt curing molds, said to represent an important time and cost saving development in the curing of V-belts, were recently announced. The molds were designed by the Campbell Machinery Development Co. and introduced by the Falls Engineering & Machine Co. Both companies are located in Cuyahoga Falls, Ohio. The feature of the new mold is that instead of the operator having to remove

V-belt being lifted from the new Campbell collapsible V-belt mold.

and stack the mold rings before and after curing, the new mold collapses and only two or three minutes are required to slip off a full complement of belts in a wide range of mold diameters. The mold also eliminates off-angle register caused by loose fitting and worn rings, thus eliminating mis-runs.

Made of steel fabricated materials, the mold does not contain links, pins, gears or racks which would interfere with the collapsing movement. One section takes up half the mold circumference and two sections the other half. There are only three register points and perfect alignment is possible because of this simple construction. The mold slides on the shaft of a manipulator. At this point two heavy-duty shafts engage hydraulically operated rotators in the manipulator and these unlock the mold, rotating the moving sections into a collapsed position. Thus, cured belts are easily removed and the cavities of the top section are filled with uncured belts. After this is done, the mold automatically expands and locks into position for curing. Collapsing and expanding is accomplished merely by pushing a control button.

The new type mold has few working parts to be affected by corrosion from steam and vapor during the curing cycles. The entire machine is built within a streamlined housing. In the accompanying illustration, a V-belt is being lifted from the collapsed mold.

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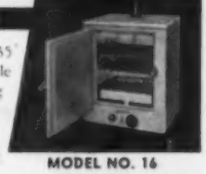
1 "PRECISION" - Thelco No. 16 UTILITY OVEN

A low priced utility oven. Temperature range 35° to 180° C. Accuracy ± ½°C. All metal, double wall cabinet, glass wool insulated. Working chamber 11"x11"x11". Offers unusual performance at very low cost. Requires little attention as there are no delicate elements requiring attention or maintenance.



MODEL NO. 16

2 "PRECISION" - Thelco No. 2 INCUBATOR

Working chamber 11"x11"x11". Temperature range 37° to 60°C. Accuracy ± ½°C. Has glass inner door which allows observation without disturbing working temperature Glass wool blanket insulation. Trouble free, bi-metallic thermostat has silver contact points.

MODEL NO. 2

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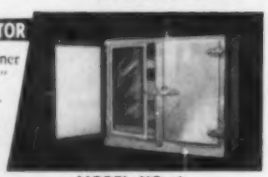
Large double door model with glass inner doors. Working chamber 35"x18"x27" Temperature range 37°C to 60°C. Accuracy ± ½°C. Users include hospitals, medical schools, research and control labs, dairy industry, etc. **Write for catalog No. 375K.**



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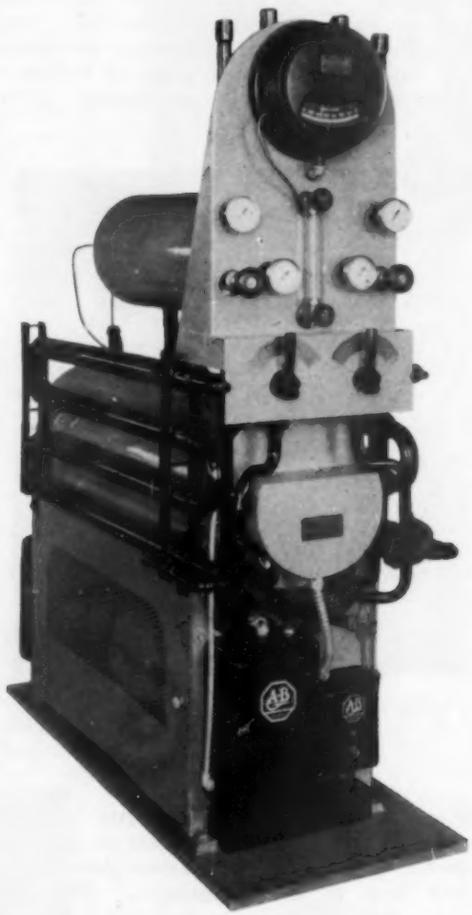
Scientific Research and Production Control Equipment

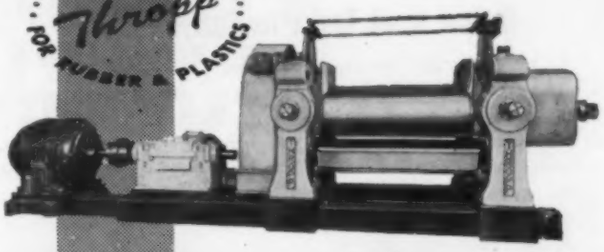
Royle Temperature Control Unit

A compact, simply-operated temperature control unit, designed to supply the wide range of extruding temperatures required by the rapidly expanding number of extrudable compounds, has been developed and introduced by John Royle & Sons, 10 Essex St., Paterson 3, N. J. Features of the new control unit include a wide temperature range, as low as 90° F. and as high as 475° F.; two independently controlled circuits; heat supplied or removed, according to operational requirements; formed piping, elimination of gaskets, and use of drip pans to promote cleanliness; a special safety factor, since the heating elements and the heat transfer oil are not in direct contact, and breakdown of heat transfer oil is reduced to a minimum.



The new control unit is available in three standard sizes—16kw, 32kw, and 48kw. Other units, with water circulation, for applications requiring temperatures between 35° F. and 200° F. can be supplied. Although specifically designed for extrusion processes, the unit is also adaptable to general industrial usages in which accurate, predetermined and constantly maintained temperatures are concerned. The company recommends Roylite Heat Transfer Oil as the heat-carrying medium for the new control unit. City water is normally used for cooling the heat transfer oil.

"CUSTOM BUILT" Thropp FOR RUBBER & PLASTICS



New Hi-Speed MILLS

22" & 22"x60" Extra Heavy Duty

Extra Heavy Duty Individual Motor Driven Mill with 15" diameter journals, having 150 H.P. enclosed herringbone gear drive. Machine is equipped with solid bronze lined bearings having oil closure seals on side of the boxes facing the rolls to prevent oil contamination of the stock. Steel cut connecting gears and Johnson Rotary Joints. Manzel mechanical lubricator and new style guides bored to fit the rolls. This is just one of the many new Thropp precision built mills designed to speed up post war production.

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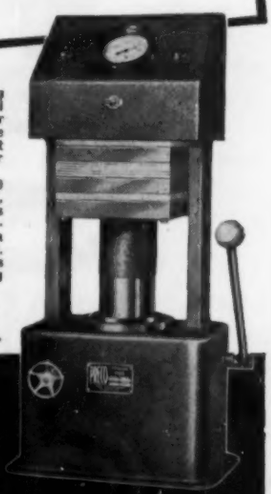

Rubber companies are saving money by using Preco Presses for experimental and small production runs — eliminating the need for interrupting production on larger presses. The Preco Press is ideal for many types of plant control jobs as well as in the laboratory for research.

The two-stage hand pump develops 40,000 pounds pressure on 8"x8" electrically heated, water cooled platens, 8¾" x 12" platens as well as steamheated platens are also available. The press can be equipped with a third platen to double the platen capacity. The pressure and temperature heat controls are extremely accurate. Maximum opening between platens is 8 inches.

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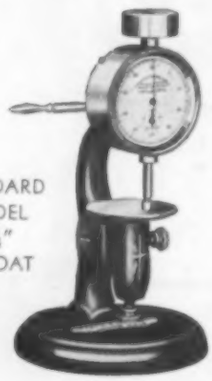

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ROLLS
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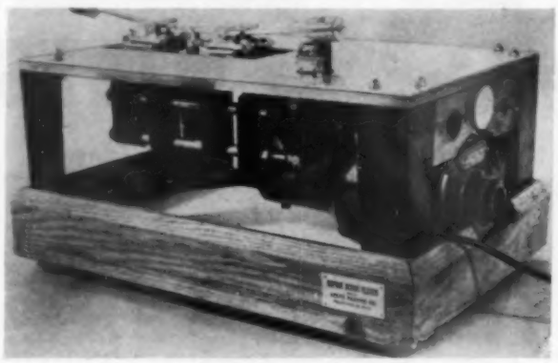
DuPont Scrub Tester for Coated Fabrics

A new scrub testing machine, developed by the DuPont Rubber Laboratories and manufactured by the Keefe Machine Co., Framingham, Mass., was recently introduced. The machine is designed to test coated fabrics of various weights and gives test results covering abrasion resistance, adhesion of coating to cloth, and elasticity of coating. Failure of the sample may occur in one of three ways, namely, by wearing through, by rupture of the film, or by separation of the film from the fabric.



The operation is accomplished by inserting two samples, cut 2 inches by 4 inches, in the horizontal clamp assemblies. These assemblies run in opposite directions with reciprocating action at the rate of 96 strokes per minute. Each stroke is recorded by a five place Veeder counter with rapid reset. A manual control for centering clamp assemblies for loading and unloading is provided. Adjustable weight arms with floating shoes provide pressure for the scrubbing action.

The DuPont Scrub Tester is powered by a ¼ h.p. special motor reduction unit. Overall size of the machine is 22 inches by 14 inches by 7 inches. It is cabinet mounted and all exposed parts are chrome finished. Additional information can be secured from the Keefe Machine Co.

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FOR FURTHER DETAILS, SEE AD ON PAGE 134

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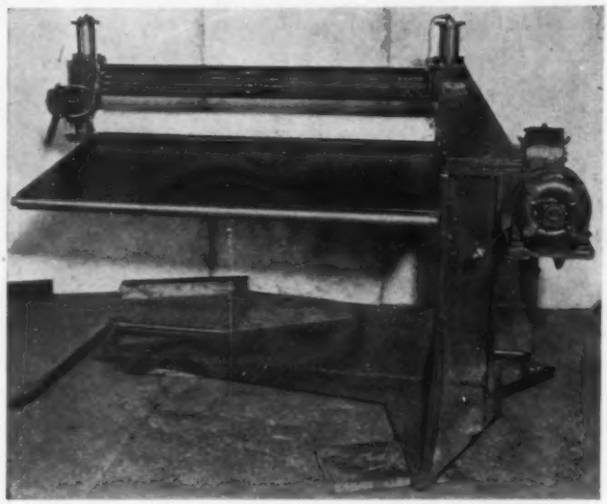

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The 12" x 12" EEMCO 42-ton Laboratory Press is furnished with self-contained hand pumping unit, air operated fast closing, steam or electric platens, adjustable opening from 6" to 18".

Both Mill and Press are designed for research, development and small scale production.

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ALL STEEL ALL WELDED
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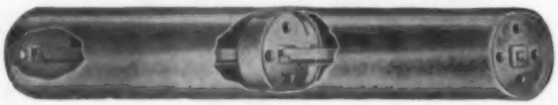

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Howe Light Cord Treating Machine

A new machine designed to thoroughly impregnate cord fiber with latex or other solutions has been developed by the Howe Machinery Co., Inc., 30 Gregory Ave., Passaic, N. J. Called the Liconormer machine, the new device is said to improve the tensile

strength of the cord, remove the stretch, and thoroughly dry and level wind the cord for further processing. Special design features, including aluminum castings, anti-friction bearings, and magnetic slip clutch wind-up, make the machine especially suitable for the processing of low tensile strength material (2 pounds and up wet breaking strength).

The Liconormer machine consists of three basic units for latexing, normalizing and drying. The latexing unit consists of a pair of driven grooved spindles mounted vertically in the tank containing the latex or other solution. Excess liquid is thrown from the cord by centrifugal force before it leaves the tank. The normalizing unit incorporates a pair of grooved conical rollers which remove a predetermined amount of stretch from the cord, the number of grooves about which the cord is threaded determining the amount of stretch to be removed. The drying unit works in conjunction with the normalizing unit, and supplies copious volumes of high velocity heated air. When the cord leaves the dryer it is level wound by the magnetic slip clutch mechanism. This type of clutch permits adjustment of cord tension during winding and prevents the cord from breaking. The Liconormer machine has a capacity of 300 feet per minute.

Davis Static Electricity Detector

An instrument for locating the source of static electricity has been developed by the Davis Emergency Equipment Co., Inc., 182 Halleck St., Newark 4, N. J. Called the Davis Statometer, the meter of the instrument, calibrated in terms of static volts, is sensitive enough to detect static charges on the order of fractional volts, either negative or positive. Provided with a two-position scale range switch, it is possible to measure any voltage from zero to 750 volts.

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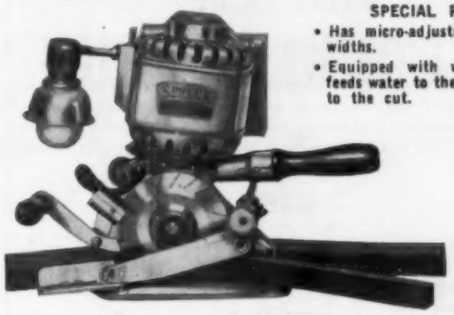
RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1″ thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
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- Automatic sharpener device keeps knife keen and sharp.
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Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

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A high quality product of greater density than "Extra Light," but high in MgO and low in impurities. An excellent value for many uses.

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PACKAGES—Specially designed to protect contents from moisture and air. Corrugated cartons with special asphalt laminated moisture-proof liner, and inner paper liner. Five-ply multi-wall bag, including special asphalt laminated moisture-proof liner.

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REVIEWS

Reclaimed Rubber: The Story of an American Raw Material. By J. M. Ball. Published by the Rubber Reclaimers Association, Inc. Available from The Rubber Age, 250 West 57th St., New York 19, N. Y. 6 x 9 in. 248 pp. $5.00.

The Rubber Reclaimers Association in 1946 selected Mr. Ball as the historian of the industry and asked him to compile a book dealing with the development of reclaimed rubber. Now a member of the staff of the Midwest Rubber Reclaiming Co., Mr. Ball is well known as the former editor of the *Vanderbilt News* and the "Vanderbilt Rubber Handbook."

The book begins with the following statement: "So far as the author is aware this is the first book devoted exclusively to the subject of reclaimed rubber. A good deal has been written on this subject, of course, but the writings are scattered through countless magazines, books, pamphlets, reports, patents, and court testimony over a long period of years. The task, therefore, has been to assemble and edit a wealth of material, to collect new data, and to present the whole in a connected form, The result is not a scientific monograph or handbook, but rather a collection of historical, commercial, and technical facts on the important industry of rubber reclaiming."

The purely historical material occupies somewhat more than half the volume, with the other portion containing chapters on scrap rubber, current practices in reclaiming, properties and uses, and statistics. The author has taken the pains to investigate carefully the original sources, searching through company records, legal papers, and patents, and talking with men who participated in some of the events described. The result is an excellent historical survey of the industry as a whole, with brief individual histories of each of the larger companies. A surprisingly large number of the early companies are still in existence, some under their original names.

Reclaiming, in one sense, began as soon as there were articles of vulcanized rubber. Mere mechanical grinding in the period 1840-1860 was later supplanted when Hall in 1858 patented the process of steam treatment for extended times. Clapp in 1871 introduced the air-blast for removing fabric. In 1881 Mitchell began the use of the acid process. The alkali process was largely developed by Marks about 1896 and patented in 1899. Reclaiming as conducted today by the alkali process follows the same principles described in the patent, but there have been many improvements in the details.

The history of the whole rubber industry itself is epitomized in the following list of chief types of rubber scrap used by the reclaiming industry at different times: boot and shoe, 1860-1915; hose, 1895-1925; bicycle tire, 1895-1915; matting and packing, 1900-1915; carriage tire, 1900-1920; solid truck tire, 1900-1930; and pneumatic motor vehicle tire and inner tube, 1905-present.

The three leading processes of reclaiming today are known as the digester ("alkali"), the heater ("pan"), and the acid processes. Brief quotations from patent literature are given concerning a number of other processes not yet generally employed. Although the mechanical treatment is well described, one finds little information regarding the nature of the reclaiming oils and none at all regarding the reinforcing and processing agents added during blending to improve the properties, to control the specific gravity, and in other ways to attain a high degree of uniformity. The reclaiming of synthetic rubber is conducted with the standard equipment already in common use for natural rubber.

The book is not intended to fill the very real need which exists for a detailed scientific monograph on the subject of reclaimed rubber. Until such a monograph appears, however, Mr. Ball's treatment will serve as a very convenient source of some of the technical information in this field. His book will always be valued for serving its primary purpose as a well-written history of the industry.

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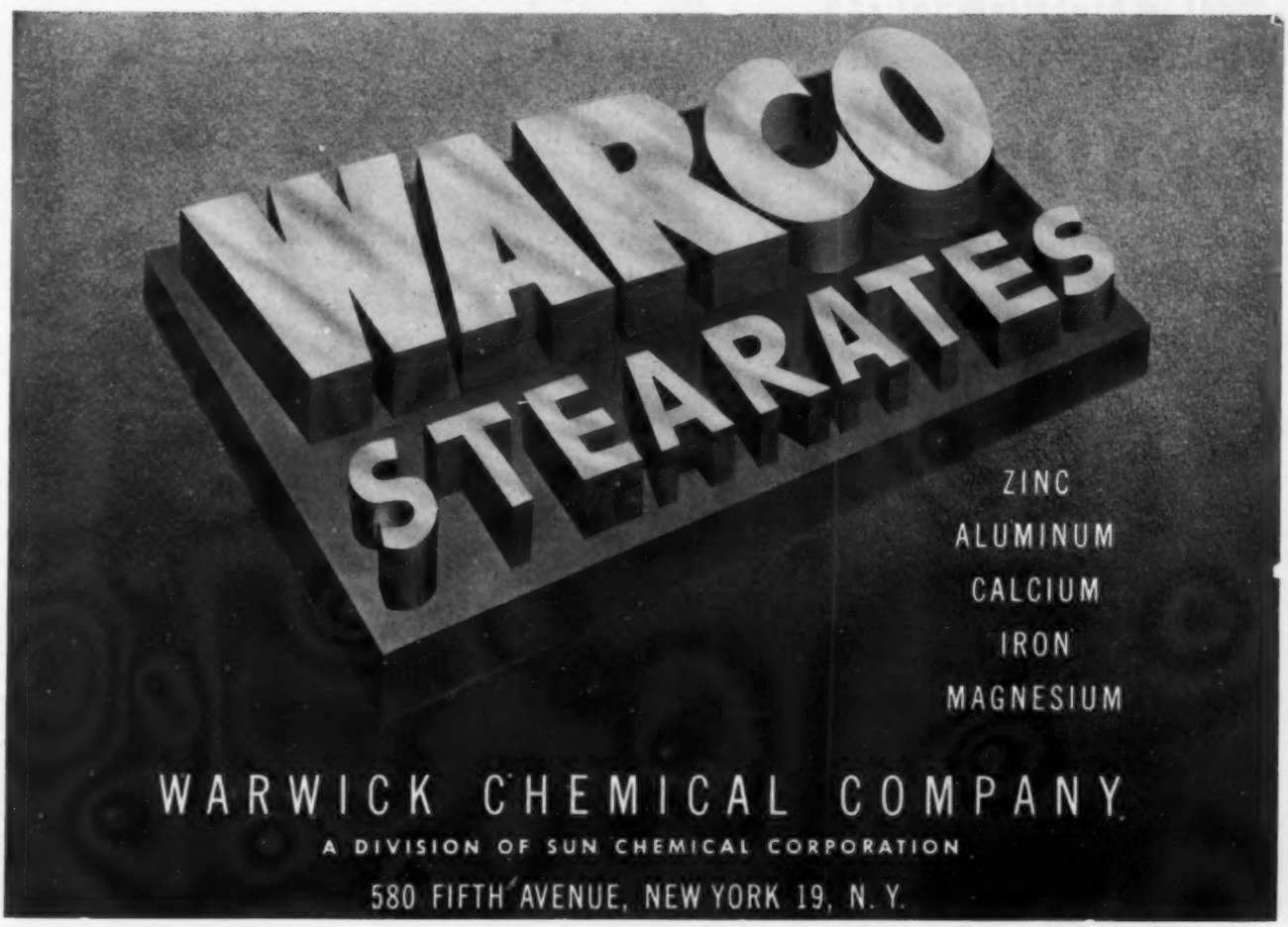

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REVIEWS (CONT'D)

Buna Rubber: The Birth of an Industry. By Frank A. Howard. Published by the D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. 6 x 9 in. 307 pp. $3.75.

This book had to be written, and it is doubtful whether any other individual was as qualified to write it as the author. It is the engrossing record of the events that attended the growth of Buna production from the days when the beginnings had to be made from foreign patents and research to the present when it ranks as an industry of far-reaching importance to the nation and the world. The author, Frank A. Howard, was from 1919 until his retirement in 1945 the principal executive of the Standard Oil Company (N. J.) interests engaged in organizing and directing oil research, technical development, and patent and chemical manufacturing activities. He engineered and negotiated many of the agreements with foreign concerns, particularly I. G. Farbenindustrie, which indirectly led to our present synthetic rubber industry.

Fragments of the synthetic rubber story, covering early German development, introduction of neoprene and Thiokol, initial Buna activities in the United States, the strides taken under the pressure of wartime emergency, the difficulties and indecisions, the charges and countercharges, the controversy and confusion, and finally the translation of blueprints into a tremendous new industry, have been pieced together and cited many times before to prove a particular thesis. Here the whole story is told with its many economic and historic facets.

The book presents factual details, many revealed for the first time, on arrangements, negotiations, licensing, and discussions which occurred between Standard Oil and various foreign and domestic concerns involving synthetic rubber. These include the organization and operation of the Joint American Study Company, more familiarly known as "Jasco," the specific agreements between Standard Oil and Farbenindustrie, events leading to the American development of butyl rubber, the initial attempt to provide for cooperative development of Buna in the United States, the licensing of Firestone and U. S. Rubber under the Buna patents and the negotiations with Goodyear and Goodrich along the same lines, and correspondence between Standard Oil executives and government officials just prior to and after the entrance of the United States into World War II.

Considerable data is also furnished in the extensive appendix which is part of the book. The "Division of Fields Agreement" between Standard Oil and Farbenindustrie is reproduced, as is the Jasco agreement. Also reproduced are the statements on synthetic rubber made by Goodyear and Goodrich to the Special Committee of the United States Senate Investigating the National Defense Program. Actual reports made by Mr. Howard to Standard Oil executives on various European trips are also included.

The book has twenty chapters in all, in addition to an introduction by Robert A. Millikan, Nobel prize winner in physics. The value of the book is enhanced by a carefully cross-referenced subject index.

•

Injection Molding of Plastics. By Islyn Thomas. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 534 pp. $10.00.

This is the first comprehensive book devoted solely to the injection molding of plastics. Designed for the plant engineer, the product and mold designer, the shop foreman, and the plastics technologist, it is a detailed, specific and thoroughly practical coverage of the history, development and mechanical problems involved in injection molding. An idea of its scope may be secured from the fact that it contains over 500 illustrations, including five color plates, most of which deal with the mechanical details of presses, mold design and operation techniques. Specific subjects treated in separate chapters include materials for injection molding, molding practices, product design, mold design and construction, finishing and decorating, estimating and costs, physical properties, and development of techniques. A brief description of the Chrysler rubber injection mold machine is included. There are 8 chapters in all, plus extensive appendixes and a subject index.

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REVIEWS (CONT'D)

Chemistry of Commercial Plastics. By Reginald L. Wakeman. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 836 pp. $10.00.

There are numerous excellent and valuable books which discuss various aspects of the plastics industry. This book differs somewhat from the usual run in that the author has successfully correlated scientific information in the domain of high polymers with actual industrial practice. As the author points out in his preface, the student has to be guided through the plant while the industrialist seeking to apply plastics in his business needs an introduction to the laboratory. Accordingly, while the text is not encyclopedic in the sense of the well-known Ellis compendium, it is selective with respect to information particularly pertinent to industrial practice.

Although not encyclopedic, the book is most comprehensive, and covers the wide range of the chemistry of the commercial plastics. Included among its 26 chapters are those devoted to raw materials; chemical principles of resinification; molding; phenolic, urea, and melamine plastics; aniline-formaldehyde and aryl sulfonamide-formaldehyde resins; polyamides; polystyrene; coumarone-indene, vinyl, acrylic and contact resins; cellulose, lignin and protein plastics; and miscellaneous resins. There is an extensive chapter covering the natural and synthetic elastomers, and a shorter chapter on rubber derivatives.

The book has cross-referenced author and subject indexes, as well as a trade name index.

•

Applied Plastic Product Design. By Robert L. Davis and Ronald D. Beck. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. 6 x 9 in. 285 pp. $5.00.

Described as "a simplified presentation of plastic product design principles for use by engineers and students alike," this book can properly be termed a handy reference book for those contemplating the design of an article to be made from plastics materials. The authors take the stand that plastics are not substitutes for wood, metals, or glass, but are rather alternate materials, useful in their own right, with definite possibilities and limitations. This thinking is reflected throughout the text which covers such subjects as flow and shape, tolerances, undercuts, threads, inserts, decoration, and design of extrusion parts, high and low-pressure molded laminated parts, and parts made from sheets, rods and tubes. A chapter is also devoted to the economics of plastics, including the type of equipment and investment in capital equipment. A general properties chart is also included. The book has 14 chapters in all, together with a number of tables, a glossary of technical words, and a subject index.

FOR FURTHER DETAILS, SEE AD ON PAGE 134

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BOOKLETS, CATALOGS, etc.

Continex HMF. (Technical Service Report R-3). Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 14 pp.

This technical report contains information on a series of tests which compare the processing behavior of Continex HMF with other carbon blacks. In the first series of tests, the relative values for Continex HMF, three other HMF-type blacks, Continex SRF, an FF-type black, and Continental AA (EPC) are given. The second series makes a comparison of Continex HMF with another gas-type HMF carbon black at 40, 80, and 120 parts loading.

•

Rosin Rubber: The Story of Hercules Dresinate 731. Hercules Powder Co., Wilmington 99, Del. 8½ x 11 in. 8 pp.

The chemical composition and properties of Dresinate 731, the company's soap of a resin derived from rosin, are described in this booklet. A comparison is presented of the advantages of GR-S-10, the first rosin rubber utilizing Dresinate 731, with GR-S incorporating fatty acid soaps. The advantages of GR-S-10 stocks are given as higher tensile strengths, greater elongation, superior tear resistance, better resistance to flex cut growth, and better hysteresis properties.

•

A Glossary of Technical Words, Terms, and Phrases Used in the Plastics and Rubber Industries. B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio. 3½ x 8¼ in. 12 pp.

As the title indicates, this booklet is a glossary of chemical words, terms, and phrases which should prove valuable as "a tailored work aid" to the plastic material manufacturer, fabricator, or designer. It is not intended to be a complete chemical dictionary, but contains useful words associated with plastics, nitrile rubbers, their use, and manufacture.

•

Personnel Administration for U. S. Distributors. U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. 8½ x 11 in. 60 pp.

Advice to tire distributors on how to improve employee relations is given in this booklet. Illustrated with pen and ink sketches, it discusses four general classifications of good employee relations, namely, security, fair treatment, equitable wages, and opportunity.

SOMETHING NEW IS HERE!

FOR FURTHER DETAILS, SEE AD ON PAGE 134

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, MAY 9, 1947

NATURAL RUBBER

Trading in futures on the Commodity Exchange was resumed on May 1 for the first time since shortly after Pearl Harbor. In the first full week of futures trading (May 5 to 9), prices recorded a net decline of 150 to 176 points from the level at the close of the previous week (May 2). The volume of transactions was small, a total of 325 contracts having been traded since resumption of the market. Prices declined in each day of the May 5-9 period, except for May 7 when a 15 to 30 point advance was recorded. With this issue we are resuming our practice of listing closing prices on the Exchange.

Refusal of the United States to pay more than 20.4 cents a pound for natural rubber was criticised severely by F. D. Ascoli, chairman, Rubber Growers Association, at the Association's annual meeting in London on April 24. Mr. Ascoli pointed out that England was paying "fantastically increased prices" for American cotton, tobacco and wheat. In view of the proposed world economic charter, he said, America's synthetic rubber should not be used as a factor to force the price of natural rubber down.

Malayan exports of sheet and crepe rubber amounted to 75,200 tons in April, as against 89,699 for March. Of the April total, 43,969 tons were shipped to the United States and 10,362 tons to the United Kingdom. Today's quotations in the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	22¼
June	22
July-September	21
October-December	20½
Thick or Thin Latex Crepe:	
Spot	35
June	35
Thin Brown Crepe, No. 2, May	19½
Ambers, No. 3, May	19½
Flat Bark Crepe, May	17½

London Market

(Standard Smoked Sheets)

July-September	20.88 - 21.09
October-December	20.15 - 20.25
January-March	19.94 - 20.15

Singapore Market

(Standard Smoked Sheets)

May	19.15 - 19.26

SYNTHETIC RUBBER

(Dry Types)

Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.390 - .415
Perbunan 26	.400 - .425
Perbunan 35	.470 - .495
Thiokol Type A	.370 - .470
Thiokol Type FA	.520 - .620
Thiokol Type ST	.750 - .850
Thiokol PR-1	.750 - .850

SCRAP RUBBER

Scrap rubber continues to be the most depressed raw material on the market. Reclaimers are reported to be almost completely out of the market for both tires and tubes. Even price concessions are reported to bring little response. According to one dealer, the market isn't taking as much of the stock as can be converted in reclaiming plants, nor as much basic stock as can be drawn from all parts of the country. No relief is seen in the immediate future. Recent quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless truck tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless passenger tires	ton	24.00
No. 1 passenger peelings	ton	50.00
No. 1 truck peelings	ton	50.00
No. 2 passenger tubes	lb.	.07½
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06½
Mixed passenger tubes	lb.	.06¼
No. 2 truck tubes	lb.	.07¼
Red truck tubes	lb.	.07
Black truck tubes	lb.	.07
Buffings	ton	18.00

COTTON TIRE FABRICS

Although the demand for tire fabric continues at an unusually high level, some slackening in the demand for chafer fabrics has been noticed in recent weeks. Export calls for all types of fabric continue, but few orders are being accepted by domestic mills. Most mills foresee difficulty in meeting overall requirements this year. There has been no change in the price structure since our last report. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.7400
Standard, Peeler, 14/4/2	lb.	.7600
Standard, Peeler, 16/4/3	lb.	.7850
Extra Staple, Peeler, 12/4/2	lb.	.8370
Extra Staple, Peeler, 14/4/2	lb.	.8508
Extra Staple, Peeler, 16/4/3	lb.	.8646

Chafers

14.4 oz. (per sq. yard)	lb.	.7150
9.25 oz. (per sq. yard)	lb.	.7450
11.65 oz. (per sq. yard)	lb.	.6450
8.9 oz. (per sq. yard)	lb.	.6900

COTTON

The price of middling uplands on the Cotton Exchange has swung in the wide range of 243 points since our last report (April 10), high for the period being 37.35 on April 22 and low 34.92 on April 14. The average price of middling uplands for the month of April was 35.89, based on 24 trading days. Although prices fluctuated irregularly throughout the period, the trend for the period as a whole was generally upward. Tending to support the market were reports that American cotton would be used to rebuild the Japanese textile industry to the 1930-34 level, and the Department of Agriculture report that mid-April cotton parity price was 28.58c, as compared with 28.15c for March. The chief depressing factor was the Government's announcement that the export subsidy payment on American cotton had been reduced from two cents to one-half cent a pound. Quotations for middling uplands on the Exchange follow:

	Apr. 10	May 9		
	Close	High	Low	Close
July	32.75	34.73	34.20	34.62
October	29.75	29.67	29.28	29.60
December	....	28.67	28.30	28.59

RECLAIMED RUBBER

Demand for reclaimed rubber still continues at high levels. Consumption in February amounted to 25,620 long tons, a drop of 7.56% below the 27,715 tons (revised) consumed in January, the drop being attributed to the shorter month. Consumption in February, 1946, totaled 20,702 tons. Current quotations on typical grades follow:

Tires				
Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾
Shoe				
Unwashed	lb.	.08	@	.08¼
Tube				
Black Tube	lb.	.12¼	@	.12½
Red Tube	lb.	.13	@	.13¼
Miscellaneous				
Miscellaneous blends	lb.	.05½	@	.06½
White	lb.	.14	@	.14¼

DUCKS

Enameling (single filling)	lb.	—	@	69.750
Belting and Hose	lb.	—	@	67.166
Single filling, A grade	lb.	—	@	63.000
Double filling, A grade	lb.	—	@	66.500

Closing Rubber Prices on New York Commodity Exchange

No. 1 Standard Contract of 10 Tons

FROM MAY 1 TO 9

Date	Spot	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Sales
May 1	23.00	21.10	20.95	20.75	20.55	20.40	20.25	20.05	19.75	19.40	19.20	19.00	142
2	23.12	21.26	21.07	20.90	20.77	20.62	20.51	20.40	20.15	19.90	19.70	19.50	25
3	——	——	——	——	——	——	——	——	——	——	——	——	——
4	——	——	——	——	——	——	——	——	——	——	——	——	——
5	22.87	20.90	20.75	20.60	20.40	20.30	20.20	20.15	19.90	19.65	19.50	19.30	20
6	22.75	20.35	20.15	20.00	19.85	19.70	19.50	19.35	19.15	19.00	18.85	18.70	12
7	23.00	20.63	20.45	20.25	20.06	19.90	19.70	19.50	19.30	19.15	19.00	18.85	88
8	23.00	20.55	20.35	20.15	20.00	19.80	19.65	19.50	19.30	19.15	19.00	18.85	13
9	22.50	19.50	19.35	19.20	19.06	18.94	18.82	18.70	18.55	18.40	18.25	18.10	25

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS										RE-EXPORTS		TOTAL NET IMPORTS
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule						
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	30,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1946	366,415	222,552,939	27.12	8,421	5,843,085	30.98	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1945:													
May	10,375	7,560,578	32.53	235	153,481	29.15	865	525,953	27.14	11,475	208	145,880	11,267
June	7,991	5,467,478	30.54	692	451,629	29.15	675	412,213	27.26	9,358	456	347,623	8,902
July	9,568	6,973,890	32.54	336	219,469	29.15	605	371,245	27.39	10,509	620	455,658	9,889
Aug.	9,741	6,880,325	31.53	624	407,677	29.15	841	506,655	26.91	11,206	894	824,976	10,312
Sept.	9,870	7,050,795	31.89	626	408,651	29.15	668	409,535	27.38	11,164	406	310,128	10,758
Oct.	10,673	7,645,618	31.98	287	187,422	29.15	646	391,971	27.07	11,606	562	369,296	11,044
Nov.	11,177	7,844,162	31.33	296	193,252	29.15	739	446,925	27.65	12,212	254	179,321	11,958
Dec.	12,844	9,273,507	32.24	382	248,604	29.15	819	498,604	27.20	14,045	525	349,385	13,520
1946:													
Jan.	18,580	13,515,971	32.48	569	371,857	29.15	446	263,279	26.33	19,595	164	41,992	19,431
Feb.	32,690	20,944,266	32.70	....	.....	....	318	171,823	24.10	33,008	723	444,400	32,285
Mar.	31,093	22,520,391	32.33	504	328,905	29.15	160	87,344	24.34	31,757	714	488,044	31,043
Apr.	26,234	18,997,757	32.33	1,001	808,463	36.06	874	467,151	23.86	28,109	392	243,952	27,717
May	4,784	3,314,818	30.93	1,052	687,100	29.11	430	219,830	22.82	6,266	422	419,278	5,844
June	8,518	6,132,895	32.15	561	366,165	29.15	466	244,580	23.41	9,545	460	446,253	9,085
July	20,641	13,947,817	30.17	696	451,523	28.96	291	148,442	22.85	21,628	2,457	1,600,600	19,171
Aug.	34,125	18,656,966	24.41	1,231	803,435	29.14	366	193,680	23.06	35,722	1,515	902,005	34,207
Sept.	41,311	22,317,275	24.12	....	.....	....	425	219,849	23.09	.....	145	81,481	.....
Oct.	45,523	24,745,403	24.27	672	438,938	29.15	691	377,319	24.38	46,886	649	613,424	46,237
Nov.	58,756	30,648,620	23.29	130	85,363	29.24	379	200,270	23.58	59,265	60	29,800	59,205
Dec.	44,159	23,810,760	23.87	2,005	1,501,336	33.43	494	265,679	24.02	46,658	17	20,625	46,641
1947:													
Jan.	92,459	51,035,472	24.64	....	.....	....	315	169,081	23.65	.....	20	16,644	.....
Feb.	57,771	30,580,942	23.63	2,426	1,550,499	28.52	481	256,760	23.84	60,678	1,991	1,149,953	58,687

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber
(Including Latex and Guayule)
(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	405,070	285,350	4,506	238,863
1945:				
May	10,067	10,164	130	102,478
June	9,940	8,995	204	103,219
July	8,739	7,698	756	103,504
Aug.	10,259	7,392	777	105,594
Sept.	12,150	5,799	560	111,385
Oct.	13,984	7,206	78	118,035
Nov.	7,288	7,575	255	117,543
Dec.	7,884	8,185	92	118,715
1946:				
Jan.	25,143	10,355	209	133,294
Feb.	35,104	10,131	290	157,977
Mar.	35,348	12,792	445	180,088
Apr.	19,847	16,914	190	182,831
May	6,126	17,867	327	170,763
June	23,382	16,466	911	176,768
July	14,942	21,998	222	169,490
Aug.	45,087	28,405	592	185,580
Sept.	46,122	31,132	988	199,591
Oct.	36,735	35,421	106	200,799
Nov.	55,231	37,323	35	218,672
Dec.	57,620	38,767	23	237,502
1947:				
Jan.†	102,080	45,328	28	294,191
Feb.†	30,318	40,983	47	283,479
Mar.	40,437	43,072	...	280,844

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Civilian Production Administration. † Excluding Guayule.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	..	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1945:						
Apr.	36	18,486	....	.....	....	.....
May	110	60,465	....	.....	3	3,244
June	8	6,872	....	.....	....	.....
July	228	128,129	....	.....	....	.....
Aug.	154	80,296	....	.....	....	.....
Sept.	49	52,148	....	.....	5	2,196
Oct.	130	83,173	....	.....	....	.....
Nov.	303	257,246	....	.....	10	6,547
Dec.	48	58,742	....	.....	18	9,983
1946:						
Jan.	129	121,228	....	.....	....	.....
Feb.	38	35,699	....	.....	5	2,178
Mar.	100	70,315	....	.....	....	.....
Apr.	362	261,098	....	.....	....	.....
May	325	212,899	....	.....	....	.....
June	80	80,006	....	.....	....	.....
July	219	178,564	115	91,412	7	19,839
Aug.	234	249,380	....	.....	4	13,438
Sept.	159	161,937	4	9,337	23	47,147
Oct.	282	367,393	21	29,307	305	216,901
Nov.	152	270,379	28	39,502	3	10,233
Dec.	199	287,167	57	41,757	26	52,096
1947:						
Jan.	183	252,580	37	29,087	36	71,252
Feb.	270	300,828	36	44,629	17	39,679

Source: U. S. Department of Commerce.

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Synthetic Rubber

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	672	1,702†
1942	22,434	.....	17,651	1,419	4,612†
1943	231,722	.....	170,891	18,148	47,295
1944	762,630	11,043	566,670	104,266	150,032
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	116,570
1945:					
Aug.	69,703	1,491	54,439	10,856	224,117
Sept.	63,754	928	45,479	3,801	239,683
Oct.	47,317	237	58,667	1,596	226,550
Nov.	48,634	471	56,227	7,984	214,289
Dec.	46,593	473	56,112	5,341	203,454
1946:					
Jan.	56,089	.....	66,993	5,715	177,051
Feb.	53,848	.....	63,770	6,415	144,427
Mar.	60,363	1,429	74,214	17,707	115,310
Apr.	66,014	536	70,703	12,878	101,510
May	66,044	366	70,914	13,102	93,447
June	63,388	415	62,899	5,161	94,095
July	63,176	353	54,562	3,175	101,007
Aug.	64,300	634	61,486	2,175	103,076
Sept.	63,765	1,031	58,798	2,480	108,840
Oct.	62,086	1,149	60,729	474	110,913
Nov.	60,305	894	57,794	1,781	113,556
Dec.	62,648	902	53,453	1,857	114,963
1947:					
Jan.	62,103	0	58,764	3,359	115,655
Feb.	59,125	0	53,321	2,166	119,912
Mar.	57,478	0	55,350	704	121,612

Source: Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies. † Does not include Buna N types.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699

Exports

1942	222	1,037	.....	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	1,020	72,920

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	36,395	6,644	1,033	3,223	47,295
1944	122,412	12,262	9,992	5,366	150,032
1945	170,571	9,703	18,378	4,802	203,454
1946	83,090	10,470	19,478	3,532	116,570

Source: Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1940	1941	1942	1943	1944	1945	1946	1947
Jan.	40,370	46,190	49,216	36,085	47,540	52,008	51,186	57,119
Feb.	37,557	42,782	42,666	36,274	47,754	48,856	47,889	50,551
Mar.	44,607	49,572	50,820	41,586	52,263	55,364	55,801	.....
Apr.	47,683	55,879	49,554	48,177	50,005	59,024	62,045	.....
May	52,946	60,121	53,212	49,828	54,230	60,748	66,774	.....
June	55,459	59,062	50,077	52,325	54,266	60,580	63,221	.....
July	53,865	63,906	54,606	49,867	55,119	66,170	69,044	.....
Aug.	55,346	63,575	48,793	51,880	55,616	70,058	66,701	.....
Sept.	52,297	59,768	50,093	49,707	56,318	64,529	62,216	.....
Oct.	53,807	58,412	50,094	53,111	53,154	55,708	66,598	.....
Nov.	49,074	54,670	50,729	50,703	54,967	53,543	61,315	.....
Dec.	46,413	53,568	39,250	48,695	52,250	49,745	61,043	.....
Total	589,424	667,505	589,110	568,238	633,482	696,333	734,833	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption—Tons	Consumption—% to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1945:					
June	20,187	19,873	29.4	996	34,353
July	17,033	15,976	26.5	836	34,574
Aug.	18,804	18,663	30.2	834	33,881
Sept.	17,246	17,365	33.9	1,323	32,439
Oct.	22,044	22,185	33.7	1,195	31,103
Nov.	20,560	20,263	31.8	859	30,541
Dec.	20,632	19,590	30.5	1,391	28,155
1946:					
Jan.	24,458	22,031	28.5	1,253	29,099
Feb.	23,187	20,702	28.0	1,368	30,216
Mar.	25,136	22,075	26.0	1,841	31,436
Apr.	23,930	22,396	25.8	1,238	31,732
May	25,322	22,162	24.9	1,338	33,554
June	24,882	21,725	27.4	1,416	35,295
July	22,619	21,350	27.9	961	35,603
Aug.	25,798	24,566	27.3	1,093	35,742
Sept.	23,956	23,715	26.4	579	35,404
Oct.	26,322	26,706	27.7	759	34,261
Nov.	24,748	24,385	25.6	1,108	33,516
Dec.	25,254	23,597	25.6	1,507	33,666
1947:					
Jan.	25,545	27,715	26.6	1,443	30,053
Feb.	23,990	25,484	27.3	1,142	27,417
Mar.	26,194	26,152	26.8	1,268	26,191

Source: 1936-40, Department of Commerce; 1941 to date, Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1938	2,000,985	485,852	2,486,837
1931	1,973,090	416,648	2,389,738	1939	2,866,796	704,308	3,571,104
1932	1,135,491	235,187	1,370,678	1940	3,692,128	721,637	4,413,965
1933	1,573,512	346,545	1,920,057	1941	3,744,300	875,381	4,619,681
1934	2,177,919	575,192	2,753,111	1942	220,814	133,083	353,897
1935	3,252,244	694,690	3,946,934	1943	0	4,501	4,501
1936	3,669,528	781,862	4,451,390	1944	0	124,819	124,819
1937	3,915,889	892,382	4,808,271	1945	83,792	313,643	397,435
				1946	2,148,677	930,739	3,079,416
1946							
Jan.	56,367	45,033	101,400	July	209,180	87,454	296,634
Feb.	57,784	34,914	92,698	Aug.	247,261	97,881	345,142
Mar.	85,810	37,636	123,446	Sept.	232,280	95,658	327,938
Apr.	132,631	80,762	213,393	Oct.	283,586	107,154	390,740
May	166,942	75,373	242,315	Nov.	269,081	100,892	369,973
June	141,090	60,038	201,128	Dec.	266,665	107,616	374,281
1947							
Jan.	247,130	101,092	348,222	July	.....	.....	.....
Feb.	266,237	106,339	372,576	Aug.	.....	.....	.....
Mar.	301,810	118,046	419,856	Sept.	.....	.....	.....
Apr.	.....	.....	.....	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1941	1942	1943	1944	1945	1946
Passenger Car	17,828,994	1,025,880	780,291	1,748,917	4,504,368	15,058,469
Truck & Bus	6,464,725	5,298,603	4,949,004	6,391,441	6,486,652	5,939,244
Agricultural	1,576,720	194,900	301,997	997,301	1,441,909	1,735,992
Earth Mover	2,593	1,814	945	703	1,308	5,520
Total	25,873,032	6,521,197	6,032,237	9,138,362	12,434,237	22,739,225

	1946		1947			
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Passenger Car	1,544,017	1,675,066	1,621,532	1,547,429	1,771,916	1,897,028
Truck & Bus	756,984	658,268	783,872	714,896	680,812	622,767
Agricultural	154,086	169,465	205,260	226,614	202,633	324,125
Earth Mover	197	334	237	185	228	2,472
Total	2,455,284	2,503,133	2,610,901	2,489,124	2,655,589	2,846,392

Source: The Tire & Rim Association, Inc.

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935 (total)	19,263	29,406	1,514	50,183	49,362	8,196
Passenger Car	17,063	26,036	948	44,047	43,256	7,054
Truck and Bus	2,200	3,370	566	6,136	6,106	1,142
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	253	33,356	33,446	2,013
Passenger Car	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1946:						
December (total)	1,839	6,086	221	8,146	7,518	2,458
Passenger Car	1,383	5,114	109	6,607	6,101	1,770
Truck and Bus	456	972	112	1,539	1,417	688
1947:						
January (total)	1,922	5,364	213	7,499	8,508	3,328
Passenger Car	1,422	4,529	109	6,060	6,889	2,477
Truck and Bus	500	835	104	1,439	1,619	851
February (total)	2,138	5,016	206	7,360	7,915	3,865
Passenger Car	1,606	4,240	93	5,939	6,429	2,949
Truck and Bus	532	776	113	1,421	1,486	916

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1943:							
Jan.-Mar.	11,155	34,287	7,819	53,261	564	9,833	10,397
Apr.-June	11,625	34,684	8,549	54,858	1,253	10,185	11,438
July-Sept.	15,754	36,854	9,618	62,226	1,220	9,184	10,404
Oct.-Dec.	15,928	42,639	10,464	69,031	1,806	12,055	13,861
Total	54,462	148,464	36,450	239,376	4,843	41,257	46,100
1944:							
Jan.-Mar.	17,135	42,783	11,452	71,370	1,812	15,830	17,642
Apr.-June	17,587	40,580	11,499	69,666	1,353	19,586	20,939
July-Sept.	16,653	38,462	11,055	66,170	1,299	25,915	27,214
Oct.-Dec.	12,982	34,107	10,948	58,037	2,773	33,630	36,403
Total	64,357	155,932	44,954	265,243	7,237	94,961	102,198
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	a	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935	19,218	28,095	754	48,067	47,879	8,231
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946	15,327	59,357	1,424	76,108	77,251	3,820
1946:						
Aug.	1,697	5,107	127	6,931	7,032	3,929
Sept.	1,641	4,998	96	6,735	7,287	4,435
Oct.	1,882	6,538	113	8,534	8,087	4,108
Nov.	1,659	5,334	172	7,165	7,643	4,365
Dec.	1,842	6,130	191	8,163	7,550	3,903
1947:						
Jan.	1,922	5,085	181	7,188	8,720	5,075
Feb.	2,129	3,988	171	6,289	7,841	6,621

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1929	26⅛	15½	20.55
1911	184	114	141.30	1930	16½	7½	11.98
1912	140	108	121.60	1931	8⅛	4¼	6.17
1913	113	59	82.04	1932	4¾	2½	3.49
1914	91	56	65.33	1933	9⅞	2⅜	5.96
1915	79	58½	65.85	1934	15⅞	8¾	12.92
1916	102	55	72.50	1935	13¾	10½	12.37
1917	90	52	72.23	1936	23	13½	16.41
1918	70	40	60.15	1937	26⅛	14	19.39
1919	57	38½	48.70	1938	17⅜	10¼	14.64
1920	56½	16	36.30	1939	24	14⅛	17.57
1921	21¾	11½	16.36	1940	24	18¼	20.10
1922	28⅜	13½	17.50	1941	24⅞	19½	22.40
1923	37⅞	24¾	29.45	1942	22½	22½	22.50
1924	40⅜	17⅝	26.20	1943	22½	22½	22.50
1925	121	34⅜	72.46	1944	22½	22½	22.50
1926	88½	36¾	48.50	1945	22½	22½	22.50
1927	41¾	33	37.72	1946	22½	22½	22.50
1928	41¼	17	22.48				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1940	1941	1942	1943	1944	1945	1946	1947
Jan.	11.19	10.66	19.85	21.34	20.76	22.36	25.49	32.58
Feb.	11.10	10.87	20.05	21.61	21.34	22.29	26.57	33.91
Mar.	10.90	11.08	20.42	21.98	21.65	22.43	27.52	35.89
Apr.	10.89	11.48	21.10	22.02	21.71	21.85	28.40	35.89
May	10.33	12.97	20.88	21.97	21.63	23.31	28.17	....
June	10.72	14.66	19.78	21.92	22.31	23.42	29.89	....
July	10.42	16.55	20.27	21.46	22.33	23.27	34.11	....
Aug.	9.84	17.06	19.45	21.09	22.11	23.10	36.31	....
Sept.	9.69	17.94	19.62	21.10	22.10	23.25	37.59	....
Oct.	9.62	17.31	19.79	21.00	22.32	23.85	36.79	....
Nov.	9.97	17.21	20.21	20.32	22.13	24.71	31.50	....
Dec.	10.18	18.09	20.55	20.32	22.28	25.21	33.03	....
Average for Year	10.40	14.66	20.16	21.34	21.89	23.25	31.28	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [a]	All Other [c]
1946:				
May	2,375	1,397	4,666	2,188
June	1,857	1,235	4,978	2,402
July	2,108	2,134	5,512	2,972
Aug.	2,426	2,910	4,874	2,733
Sept.	1,054	3,103	4,886	2,792
Oct.	1,429	3,069	5,349	3,098
Nov.	893	3,660	5,693	3,209
Dec.	4,771	1,113	6,243	3,261
1947:				
Jan.	6,197	1,237	6,802	3,097
Feb.	5,131	892	5,345	2,255
Mar.	5,853	1,142	6,922	3,081

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers and extenders; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

Month	1945 All Rubber Products Number	1945 All Rubber Products Index	1945 Rubber Tires & Tubes Number	1945 Rubber Tires & Tubes Index	1946 All Rubber Products Number	1946 All Rubber Products Index	1946 Rubber Tires & Tubes Number	1946 Rubber Tires & Tubes Index
Jan.	199	164.9	97	178.5	209	172.7	99	182.4
Feb.	200	165.1	96	178.0	214	177.1	101	187.3
Mar.	209	173.2	96	176.8	220	181.5	104	191.6
Apr.	205	169.6	93	172.2	220	182.0	104	192.8
May	201	166.6	92	169.2	221	182.7	105	193.4
June	199	164.5	90	166.7	225	186.1	106	195.8
July	194	160.5	88	162.1	218	180.2	99	183.1
Aug.	191	158.0	86	159.3	227	187.5	103	189.9
Sept.	165	136.5	72	132.7	233	192.8	107	197.0
Oct.	187	154.4	88	163.0	240	198.7	110	204.0
Nov.	194	160.1	91	168.9	245	202.9	112	207.0
Dec.	203	168.2	96	177.8	248	204.7	112	207.2

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	291.0	288.9	323.2	342.4	290.1	272.6
Feb.	295.7	295.6	323.6	339.8	292.1	271.9
Mar.	297.0	299.3	315.4	301.9	302.8	281.1
Apr.	281.3	280.0	315.9	306.0	324.9	312.9
May	283.3	283.0	299.8	288.6	327.6	314.2
June	281.4	278.5	304.3	293.8	337.2	318.3
July	279.7	280.9	298.7	286.8	327.2	304.3
Aug.	291.0	294.3	265.7	249.7	343.2	311.2
Sept.	294.5	300.8	231.3	211.4	370.9	348.9
Oct.	293.3	297.5	254.2	239.8	368.5	346.1
Nov.	293.6	298.2	257.8	240.2	385.1	360.3
Dec.	308.5	319.4	275.5	256.7	402.3	371.5

Wages — Average Weekly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$48.18	$55.79	$54.49	$64.29	$46.71	$50.29
Feb.	48.95	57.21	54.40	64.04	46.05	49.21
Mar.	49.53	58.38	50.62	57.29	46.46	49.72
Apr.	48.12	55.63	51.93	59.75	49.67	54.77
May	48.98	57.11	50.09	57.32	49.82	54.72
June	49.30	56.78	51.45	59.20	50.45	54.82
July	49.17	57.01	51.81	59.59	50.60	56.11
Aug.	50.24	58.62	46.76	52.81	51.03	55.42
Sept.	50.99	59.33	47.20	53.59	53.69	59.89
Oct.	50.92	58.54	45.57	49.48	51.74	57.38
Nov.	50.59	58.30	44.68	47.78	52.98	58.87
Dec.	52.64	61.62	45.48	48.54	54.73	60.55

Wages — Average Hourly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$1.066	$1.224	$1.151	$1.317	$1.121	$1.255
Feb.	1.072	1.240	1.149	1.314	1.129	1.266
Mar.	1.086	1.256	1.117	1.260	1.138	1.275
Apr.	1.075	1.234	1.136	1.294	1.232	1.414
May	1.087	1.257	1.132	1.284	1.266	1.446
June	1.092	1.254	1.140	1.307	1.283	1.461
July	1.094	1.256	1.138	1.296	1.292	1.472
Aug.	1.102	1.264	1.119	1.269	1.295	1.474
Sept.	1.117	1.273	1.098	1.243	1.323	1.507
Oct.	1.108	1.263	1.100	1.231	1.313	1.492
Nov.	1.107	1.258	1.112	1.249	1.322	1.503
Dec.	1.130	1.290	1.113	1.247	1.330	1.509

Hours — Average Weekly Hours per Worker

Month	1944	1945	1946	Month	1944	1945	1946
January	45.2	47.3	41.7	July	45.0	45.5	39.2
February	45.7	47.3	40.8	August	45.6	41.8	39.4
March	45.6	45.3	40.8	September	45.7	43.0	40.6
April	44.7	45.7	40.3	October	45.9	41.4	39.4
May	45.1	44.2	39.4	November	45.7	40.2	40.1
June	45.2	45.2	39.3	December	46.6	40.9	41.2

Source: U. S. Department of Commerce.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1944	1945	1946	Month	1944	1945	1946
Jan.	242	247	215	July	227	218	211
Feb.	244	247	216	Aug.	231	193	221
Mar.	242	236	221	Sept.	230	172	234
Apr.	231	233	219	Oct.	231	191	234
May	230	224	215	Nov.	231	192	243
June	228	222	218	Dec.	239	205	252

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	274	311	229	July	295	274	268
Feb.	299	351	242	Aug.	288	255	282
Mar.	290	351	260	Sept.	297	200	311
Apr.	295	356	282	Oct.	342	260	333
May	293	333	288	Nov.	293	212	313
June	316	333	293	Dec.	341	292	352

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	179.6	170.6	173.7	July	174.7	183.3	195.6
Feb.	185.2	176.7	179.9	Aug.	172.9	182.4	198.0
Mar.	187.6	175.5	186.4	Sept.	174.3	177.4	204.0
Apr.	190.6	175.3	198.5	Oct.	174.3	167.7	212.0
May	188.1	178.3	195.5	Nov.	176.1	167.1	215.0
June	182.1	178.7	192.4	Dec.	169.6	169.0	216.0

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1939	1940	1941	1942	1943	1944	1945
Asphalt [a]							
Short tons	24,293	22,772	20,536	22,263	16,510	20,189	19,483
% of total	1.0	0.9	0.6	0.6	0.5	0.6	0.5
Barite (Barytes):							
Short tons	3,319	4,283	9,800	6,334	8,000	10,000	10,000
% of total	2.0	2.3	4.2	3.6	3.9	2.9	2.1
Carbon Black:							
Short tons	158,311	155,090	219,751	147,974	236,737	369,015	402,193
% of total	56.5	58.5	68.2	65.8	75.2	78.7	78.9
Clay, Kaolin:							
Short tons	90,287	92,640	127,055	51,334	50,964	59,588	109,936
% of total	11.6	11.1	11.6	5.1	5.5	6.8	11.7
Clay, Fire & Stoneware:							
Short tons	3,770	10,104	9,000	5,000	10,259	7,160	7,800
% of total	0.2	0.4	0.2	0.1	0.2	0.1	0.1
Lead Sulfate, Basic:							
Short tons	140	128	200	89	131	268	200
% of total	2.5	2.1	1.9	1.1	2.3	4.2	5.2
Lime:							
Short tons	1,357	1,879	3,058	1,381	2,039	5,634	7,170
% of total	0.03	0.03	0.05	0.02	0.05	0.13	0.10
Litharge:							
Short tons	1,404	1,590	3,968	3,460	4,302	3,023	1,864
% of total	1.6	1.8	3.3	3.8	3.8	2.2	1.3
Lithopone:							
Short tons	3,189	3,387	3,547	1,047	1,078	726	977
% of total	2.2	2.2	2.0	0.8	0.8	0.5	0.7
Mica, Ground:							
Short tons	2,539	1,731	3,476	1,754	3,063	1,137	3,715
% of total	8.2	6.2	8.0	3.7	6.0	2.2	7.0
Sulfur:							
Short tons	49,000	54,000	63,000	40,000	51,000	63,000	64,960
% of total	2.5	2.5	2.4	1.4	1.8	1.9	2.0
Talc [b]							
Short tons	31,078	28,501	58,114	40,487	48,994	51,833	62,049
% of total	12.4	10.0	13.9	10.0	11.8	13.0	15.0
Zinc Oxide:							
Short tons	70,187	70,979	90,429	52,717	67,898	59,518	63,447
% of total	61.3	62.8	63.4	53.0	47.4	42.3	49.6

Source: U. S. Bureau of Mines.

Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes pyrophyllite and ground soapstone.

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MILL ROOM SUPERINTENDENT, practical experience in compounding, mixing, calendering tires, sundries, footwear, and vinyl film, seeks position with responsible concern. Address Box 2454, RUBBER AGE.

RUBBER AND PLASTIC CHEMIST, thoroughly experienced production supervision, compound formulation, product development of calendered, spread, and molded goods from rubber, synthetic rubber, and vinyl resins, desires responsible position N.Y.C. area. Address Box 2460, RUBBER AGE.

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RUBBER CHEMIST, forty-three, Ph.D., eighteen years of wide experience in research, development and technical direction in molded, extruded and mechanical goods, drug sundries, foamed and dipped latex (surgeons and household gloves), desires to work with progressive organization. Location immaterial. Address Box 2482, RUBBER AGE.

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CHINESE CHEMIST, young, college graduate with several years factory experience, one year in rubber industry, desires to cooperate with any company that wants to sell or manufacture rubber products in China. Address Box 2477, RUBBER AGE.

RUBBER CHEMIST, B.S., experienced in natural and synthetic rubbers, resins, formulations for calender and spread coatings, oil and water resistant materials. Desires responsible position in sales or product development. Location, East; other localities considered. Available immediately. Address Box 2481, RUBBER AGE.

RUBBER AND LATEX CHEMIST with eighteen years of research and factory experience wants position in technical sales, domestic or foreign travel. Speaks several languages fluently. Ph.D. Good appearance and personality. Single. Address Box 2483, RUBBER AGE.

LATEX CHEMIST, B.S. Degree, twenty-three years of age, single, three and one-half years experience as chemist and technical director on dipped goods, adhesives, extruded thread, foamed latex. Desires location in New England or middle Atlantic coast. Minimum salary $2,600. Address Box 2488, RUBBER AGE.

HELP WANTED

PATTERNMAN AND DESIGNER wanted by large manufacturer of Fabric-Waterproof Footwear. Prefer a man experienced in rubber pattern making, however leather patternman who could adapt himself is requested to reply. Please write giving full details regarding age, employment record, references, and salary expected. Address Box 2463, RUBBER AGE.

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DEVELOPMENT CHEMIST, young, with several years experience in rubber industry, for development work on synthetic rubbers, adhesives, plastics used in fabric coatings. Excellent opportunity. Metropolitan New York area. In reply give complete resume and minimum salary requirements. Enclose small photo. Address Box 2474, RUBBER AGE.

RUBBER COMPOUND MAN for small molded goods plant. Complete rubber shop experience will help—ability to price, analyze stocks, etc. Good opportunity for right man. Address Box 2479, RUBBER AGE.

MECHANICAL ENGINEER wanted by medium sized Eastern rubber manufacturer. A high class man, experienced on rubber or textile machinery, capable of taking full charge of all upkeep, planning or designing new equipment, plant layout. Write giving age, education, experience, and previous employers. Address Box 2485, RUBBER AGE.

POSITION OPEN with a Southern Sponge Rubber Goods Plant for a compounder. Experience with sponge rubber preferred. In reply state age, education, detail, experience and salary expected. Address Box 2489, RUBBER AGE.

FOREMAN, qualified to manage small rubber shop producing molded and extruded items. Factory employs about sixty (60) people. Give full details of experience in confidence. Address Box 2490, RUBBER AGE.

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See Page 182

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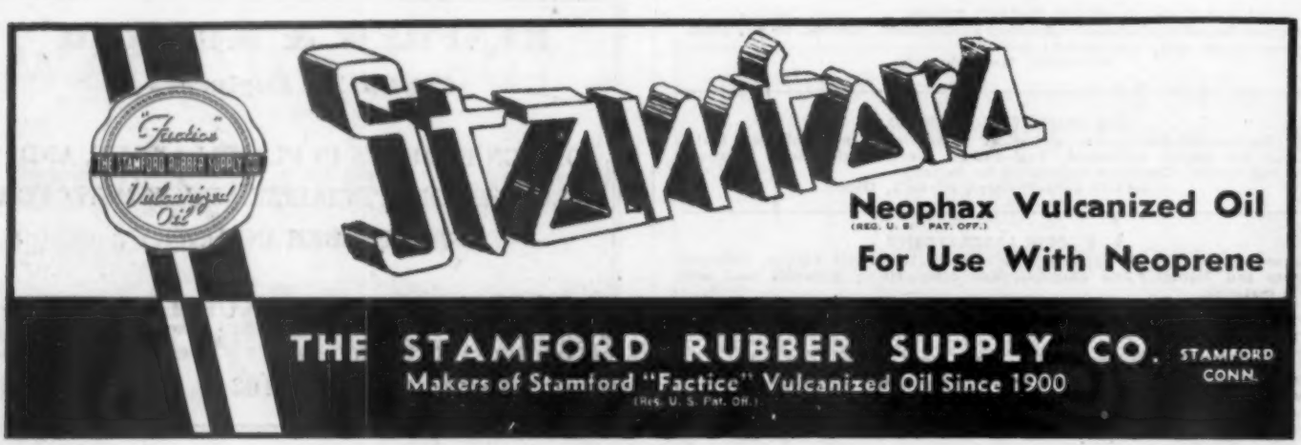

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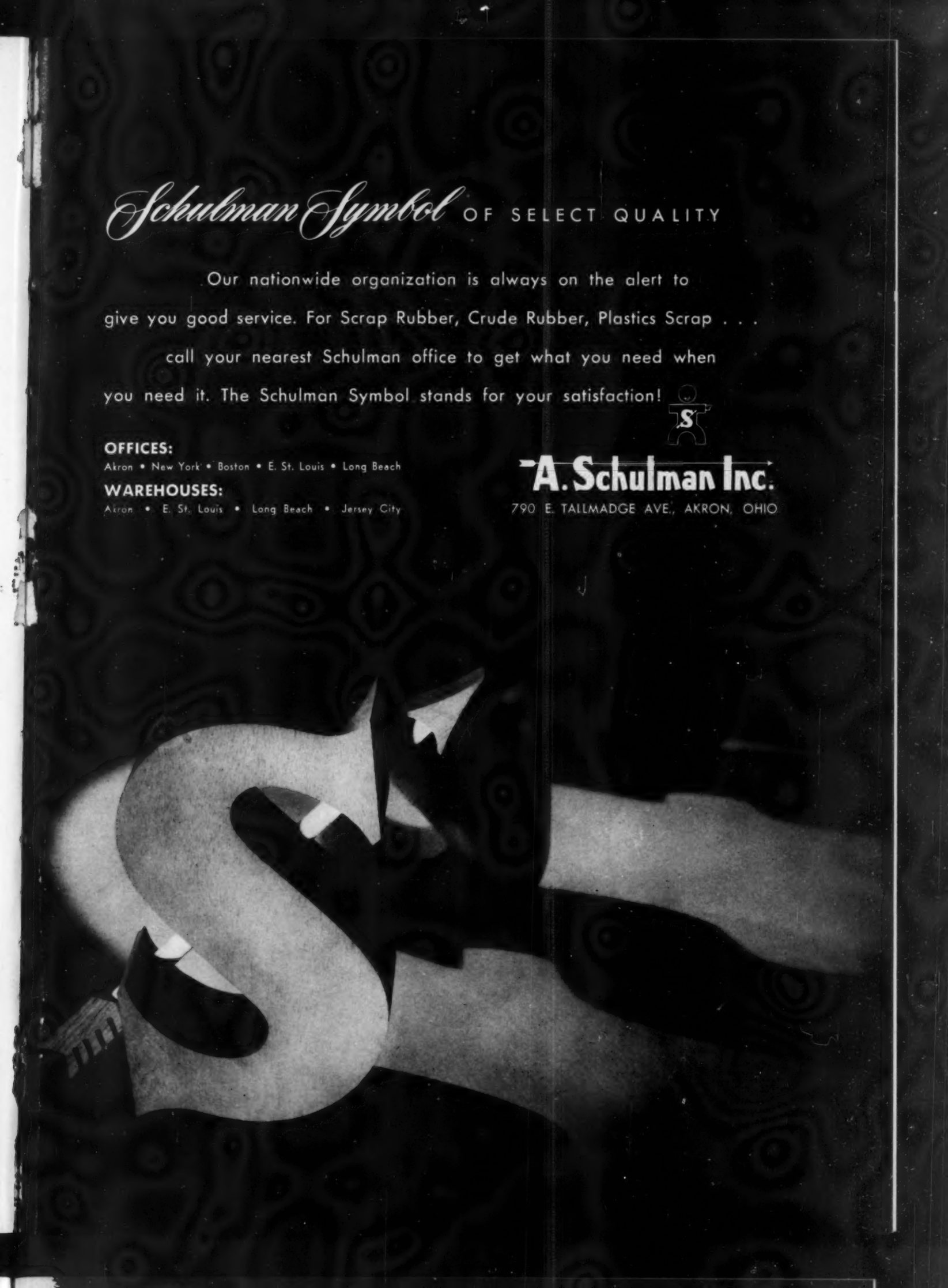

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